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PUBLIC DOCUMENT NO. 57

REPORT

OF

Connecticut Rivers, Harbors and Bridges Commission

TO THE

GENERAL ASSEMBLY

For two years ended December 31, 1912

PRINTED IN COMPLIANCE WITH STATUTE

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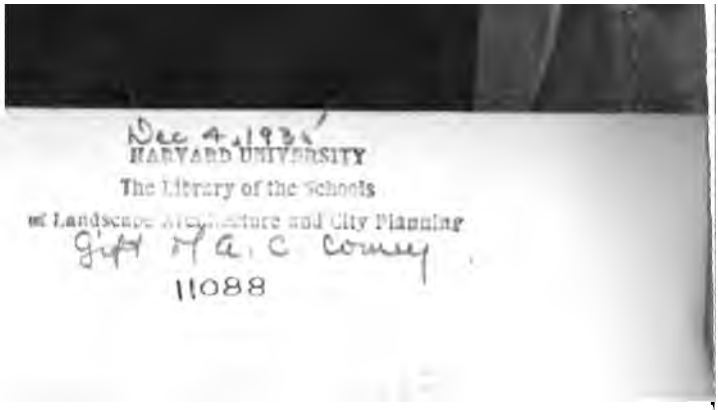
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State of Connecticut

REPORT

OF

Connecticut Rivers, Harbors and Bridges Commission

1913

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assistance for the commission and also the necessary expenses of the members of the commission in the performance of their duties, but the members of said commission shall serve without compensation.

SEC. 5. This act shall take effect from its passage.

Approved, June 22, 1911.

It is our sad duty to report that on July 26, 1912, Commissioner Oliver Gildersleeve was suddenly stricken and taken from us. By his devotion to duty, his sincere belief in the development of the waterways of the state, his unfailing courtesy and his sterling character he endeared himself to all who were so fortunate as to know him. He was born at Gildersleeve, Conn., which was his lifelong home, March 6, 1844, and was interested in all that would better the state civically, commercially and religiously. With his sons he conducted a shipbuilding yard on the Connecticut river and was connected with many financial, manufacturing and shipping enterprises. Not only has the Commission lost a respected advisor, but the state has lost an earnest advocate.

Mr. Thomas I. Kinney of New Haven was appointed by Governor Baldwin to fill the unexpired term of Mr. Gildersleeve.

INTRODUCTORY.

The Rivers, Harbors and Bridges Commission was instructed by the General Assembly of 1909 to make an investigation of the rivers and harbors of the state and report their findings to the session of 1911. This was done to the best of their ability with the means and time at hand and a report submitted in printed form.

This report contained the then obtainable facts concerning our neglected waterways and at the same time endeavored to show in an interesting way the manner pursued by foreign countries in developing their harbors, rivers and terminal facilities. The report contained about 80 pictures elucidating vividly the magnificent efficiency obtained and showing conclusively to those acquainted with our ports the lack of terminal facilities and the apparent lethargy of the people of the state in allowing those ports that are susceptible of tremendous improvement to remain almost idle.

It will be noted by referring to the Commission's report of 1910 that statistics were given showing the position of the state among those of the Union in reference to its manufactures. In this report we bring them up to date. It is not incongruous to associate manufactures with waterway problems; because Connecticut being preeminently a manufacturing state, must fully recognize that in its continued prosperity, transportation by water is a vital factor to be reckoned with.

It is interesting to study the table of manufactures and to note the increase in the past decade of the manufactured product. Closely associated with it is the increased population, it being the wage-earner who contributes to this increase to the largest degree and not the agriculturist. Since 1879 there has been a decrease in the acreage of corn, oats, rye, hay and potatoes, while tobacco is the only agricultural product to gain acreage in the interim.

However, the value of the agricultural product has increased almost $10,000,000 in the last ten years. Intensive farming will still further add to the value of this important industry. While the increase in the value of the manufactured product has increased 31.7% since 1900, which is noteworthy, yet note the rank of the state among its 48 sisters. From 8th to 12th place in the last ten years, which brings it vividly to the mind that four states have come from below us, equaled us and passed us. In 1850 the state's proportion of the total value of product in the United States was 4.6%, in 1900 2.8%, and in 1910 2.4%. The tables showing the value of products in the leading cities and boroughs and the amount of capital invested are worthy of close study. After giving the facts herein shown due consideration and keeping in mind constantly that we are one of the

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New England States, on the northeast seaboard, far removed from the field of raw material, and remembering that a recent census report showed that the staple growing cotton states of the South consumed more bales of cotton last year in their mills than did the mills of New England, thus rising from the position of practically not a mill at the close of the war, and not entering the era of great development until about 1890, we are forced to note that in a period of about 20 years the South has passed New England, yet we have made great strides in the cotton industry. One thing is evident from the foregoing facts and many others that may be cited: we must do two things that are pressing, first, improve our transportation facilities by the development to the highest degree of efficiency, our rivers and harbors and construct canals where feasible, so that our industries may receive their raw material at the lowest possible freight rates and with the necessary expedition and may in turn ship the manufactured product in the same cheap and expeditious manner. This means proper coordination of rail and water carriers, proper terminal facilities and the improvement of our many natural waterways so that we may lead instead of being led. Second, to make in our factories a product always a little better than the factories elsewhere make.

We do it now through years of experience. To continue, we should establish proper technical and manual-training schools. These two things we can do and thus maintain our place among the manufacturing states, keep our industries, get more, add to our population and be a recognized factor in the trade of the world.

CONNECTICUT.

Manufactures.

	1900	1905	1910
Population,	908,420	*	1,114,756
Persons engaged in manufactures,	168,991	198,046	233,871
Number of establishments,	3,382	3,477	4,251
Primary horse power,	256,331	304,204	400,275
Capital,	$299,206,925	$373,284,000	$517,547,000
Value of products,	315,106,000	369,082,000	490,272,000
Rank of state in manufactures,	8th	11th	12th

Agriculture.

Value of product,	$28,276,948	$37,493,836
Rank of state in agriculture,	38th	39th

* No census.

LEADING MANUFACTURING CITIES AND BOROUGHS OF THE STATE SHOWING VALUE OF PRODUCT, RANK AND POPULATION.

	1900	1905	1910	Rank	Pop. 1910
Bridgeport,	$33,536,000	$44,587,000	$65,609,000	1	102,054
Hartford,	23,829,000	25,974,000	40,680,000	4	98,915
New Haven,	34,899,000	39,666,000	51,071,000	2	133,605
Waterbury,	30,330,000	32,367,000	50,350,000	3	73,141
Meriden,	11,750,000	13,764,000	16,317,000	7	32,066
New Britain,	11,096,000	14,960,000	22,021,000	5	43,916
Ansonia,	18,515,000	19,132,000	20,088,000	6	15,152
Torrington,	9,178,000	9,674,000	12,550,000	8	16,840
Naugatuck,	8,887,000	11,010,000	11,033,000	9	10,541
Danbury,	6,527,000	8,066,000	10,318,000	10	23,502
Norwich,	5,935,000	6,022,000	9,389,000	11	28,219
Stamford,	3,920,000	5,890,000	8,740,000	12	28,836
Willimantic,	3,023,000	4,902,000	6,733,000	13	11,230
Middletown,	4,152,000	4,351,000	4,955,000	14	20,749
New London,	4,221,000	4,710,000	4,483,000	15	19,659

CAPITAL INVESTED IN MANUFACTURES IN CITIES OF THE STATE.

	1900	1905	1910
Bridgeport,	$31,625,000	$49,381,000	$62,779,000
Hartford,	28,057,000	28,359,000	48,085,000
New Haven,	27,962,000	31,413,000	52,014,000
Waterbury,	21,967,000	32,950,000	44,653,000
Meriden,	15,417,000	16,442,000	17,675,000
New Britain,	13,768,000	19,980,000	31,790,000
Ansonia,	6,240,000	7,626,000	9,763,000
Torrington,	6,039,000	9,157,000	15,692,000
Naugatuck,	6,607,000	7,900,000	8,642,000
Danbury,	3,423,000	4,037,000	7,786,000
Norwich,	6,438,000	8,475,000	12,531,000
Stamford,	4,813,000	7,526,000	11,926,000
Willimantic,	5,621,000	6,682,000	9,919,000
*Middletown,	4,816,000	3,583,000	3,544,000
New London,	4,256,000	4,590,000	5,467,000

* Does not include the town of Middletown which was included in the census of 1900.

It is a source of gratification to the Commission and we hope it will be to the state, to know how well the first attempt to bring out conditions was received throughout the United States. It was necessary to have

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three editions printed to supply the demand; hence beyond doubt Connecticut now takes a place among the states of the Union, as at least endeavoring to improve her waterways for the use of the manufacturer, the business man and the people as a whole. The War Department through the Board of Engineers of the United States Army requested a supply of the reports, they placing one in the hands of every division engineer in the country. Letters were received complimenting the publication from the engineers.

Referring to the Report, on December 7, 1911, Brig-Gen. William H. Bixby, Chief of Engineers, U. S. Army, said in part in a speech before the National Rivers and Harbors Congress at Washington, D. C.:

"This year, just as much as last year, one of the features most urgently requiring your careful consideration is the development of improved terminals, and their municipal control, as well as the enactment of such state and federal legislation as will require all railroad lines to transfer to water lines, and to give through bills-of-lading and the use of all their loading and transfer facilities to any freight which shippers may desire to have consigned over mixed railroad and water routes. There have been published during the past year several pamphlets of great value on the subject of terminal facilities; as those by Professor Clapp, of New York University, on the navigable Rhine and on the Port of Hamburg, and those of the New York City Dock Commission, and the *Connecticut State Rivers and Harbors Commission* wherein much detail is given to the best arrangement of docks, etc."

We reproduce below several letters to show that other sections of the country are thoroughly alive to the development of their waterways and terminal facilities and appreciate what the State of Connecticut is endeavoring to do.

MISSISSIPPI RIVER COMMISSION.

Fourth District.

Metropolitan Bank Building.

NEW ORLEANS, LA., February 21, 1912.

MR. EDWARD H. WARNER,
Chairman, Rivers and Harbors Commission, State of Connecticut,
Hartford, Conn.

Dear Sir:—I beg to acknowledge receipt of the report of your Commission on the Rivers and Harbors of Connecticut with the memoir by Mr. Frederick L. Ford upon certain European ports. I have read this with much interest and congratulate you upon the completeness with which the work of the Commission has been carried out. This report will be placed on file for official use in this office, and any further publications

of a similar nature issued by you, we will be very glad to receive. Thanking you, I am

Yours very truly,

C. V. SHERRILL,
Captain, Corps of Engineers.

ISTHMIAN CANAL COMMISSION.

Canal Zone.

EMPIRE, February 23, 1912.

MR. EDWARD H. WARNER,
Chairman, Rivers and Harbors Commission,
Hartford, Conn.

Dear Sir:—I beg to acknowledge with many thanks the receipt of a copy of the Report of Connecticut Rivers and Harbors Commission, 1910, furnished by you and sent to the officers of the Corps of Engineers by the Chief of Engineers, U. S. A.

I shall read with much interest this valuable report which comes at a very opportune time, now that we are planning and constructing terminal facilities for the Panama Canal at both the Atlantic and Pacific entrances.

Very respectfully,

D. D. GAILLARD,
Member Isthmian Canal Commission.

Department of
Practical Military Engineering.

UNITED STATES MILITARY ACADEMY.

WEST POINT, NEW YORK, February 16, 1912.

MR. EDWARD H. WARNER,
Chairman, Connecticut Rivers and Harbors Commission,
Hartford, Conn.

Dear Sir:—I take pleasure in acknowledging receipt of the report of the Commission of which you are chairman, transmitted to me through the Chief of Engineers, U. S. A.

It places a great deal of valuable information in a compact and interesting form and I desire to thank you for the copy sent me.

Yours truly,

G. A. YOUNGBERG,
Captain, Corps of Engineers.

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WAR DEPARTMENT,

UNITED STATES ENGINEER OFFICE.

New York, District No. 1.

Room 710, Army Building, 39 Whitehall Street.

NEW YORK CITY, February 20, 1912.

MR. EDWARD H. WARNER,
Chairman, Connecticut Rivers and Harbors Commission,
Hartford, Conn.

Dear Sir:—I have received through General W. H. Bixby, Chief of Engineers, U. S. A., a copy of the "Report of Connecticut Rivers and Harbors Commission, 1910." This report will be of valuable assistance to this office in connection with the question relating to terminal facilities and port developments.

Very respectfully,

W. M. BLACK,
Colonel, Corps of Engineers, U. S. A.

ATLANTIC DEEPER WATERWAYS ASSOCIATION.

The Crozer Building.

PHILADELPHIA, PA., February 21, 1912.

MR. E. H. WARNER,
Hartford, Conn.

Dear Mr. Warner:—This office is in receipt from General Bixby, Chief of Engineers, U. S. A., of a copy of the 1910 Report of the Rivers and Harbors Commission of the State of Connecticut, and I want to take this opportunity to congratulate you upon this well deserved recognition of your work as Chairman of the Commission.

With best wishes, I am

Yours very truly,

DURELL SHUSTER,
Assistant Secretary.

OFFICE OF SUPERINTENDENT,

STATE, WAR AND NAVY DEPARTMENT BUILDING.

WASHINGTON, D. C., February 23, 1912.

MR. EDWARD H. WARNER,
Connecticut Rivers and Harbors Commission,
Hartford, Conn.

Dear Sir:—I have received from the Chief of Engineers a copy of the

report of your Commission for 1910, containing much interesting information both about your state and about European harbors. This report is a valuable contribution to the literature on river and harbor engineering, and I beg you to accept my thanks for the copy furnished me.

Yours truly,

U. S. GRANT 3rd.
Captain, Corps of Engineers.

UNITED STATES ENGINEER OFFICE.

Upper Mississippi River Improvement.

ROCK ISLAND, ILL., May 31, 1912.

MR. EDWARD H. WARNER,
Chairman of Rivers and Harbors Commission, State of Connecticut,
Hartford, Conn.

Dear Sir:—Some time ago, while absent in Panama, I received from General Bixby a copy of the report of your Commission for the year 1910. Reading this report has been delayed until recently.

I now take the liberty of expressing to you my high appreciation of your public-spirited labor, which has placed at the disposal of all interested a large amount of useful and well selected information.

Very respectfully,

C. KELLER,
Major, Corps of Engineers.

COMPANY "A," 1ST BATTALION OF ENGINEERS.

WASHINGTON BARRACKS, D. C., February 16, 1912.

MR. EDWARD H. WARNER,
Chairman, Connecticut Rivers and Harbors Commission,
Hartford, Conn.

Dear Sir:—I have the honor to acknowledge the receipt of the "Report of the Rivers and Harbors Commission of the State of Connecticut," which I have examined with considerable interest.

It is a great pleasure to those of the Federal River and Harbor service to note the interest displayed by the state in connection with its natural waterways and with the necessity for terminal facilities, especially when the results are set forth in a report such as you were kind enough to send me.

Very respectfully,

C. W. ORWELL,
Captain, Corps of Engineers.

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THE ARMY SERVICE SCHOOLS.

FORT LEAVENWORTH, KANSAS, February 17, 1912.

MR. EDWARD H. WARNER,
Chairman, Connecticut Rivers and Harbors Commission,
Hartford, Conn.

Dear Sir:—I have just received through the office of the Chief of Engineers, U. S. A., a copy of your report of 1910.

I wish to thank you for this most interesting report. The subject of terminal facilities is the most difficult and important one to be considered in the development of our water-borne commerce; and I do not believe that the problem can be solved correctly until the Federal Government, the State Government and the municipalities take it up. No symmetrical development will result if the matter is left to private interests.

Very respectfully,

W. L. GUTHRIE,
Captain, Corps of Engineers.

FORT BAYARD, N. M., February 27, 1912.

MR. EDWARD H. WARNER,
Chairman, Connecticut Rivers and Harbors Commission,
Hartford, Conn.

Dear Sir:—I have read with great appreciation the report of your Commission for 1910, copy of which, through your kindness, was sent by the Chief of Engineers, U. S. A., to the U. S. Engineer's Office at Los Angeles, Cal.

The great subject of port development is intensely interesting to me, for until a recent breakdown from overwork, I was in charge of United States river and harbor work in southern California, where both San Diego and Los Angeles are at present making great studies in development of port facilities.

Your report is such a valuable one that I would greatly appreciate the favor if you would send me a copy for my personal library and for further study, for the copy I have been reading must be returned to Los Angeles. Franked envelope for transmission of the above report is enclosed.

Very respectfully,

CHAS. T. LEEDS,
Captain, Corps of Engineers, U. S. A.

WAR DEPARTMENT,

UNITED STATES ENGINEER OFFICE,

723 Central Building.

LOS ANGELES, CAL., March 16, 1912.

MR. EDWARD H. WARNER,
Chairman, Rivers and Harbors Commission,
Hartford, Conn.

Sir:—I have received from the Chief of Engineers, U. S. A., a copy of the 1910 Report of the Rivers and Harbors Commission of the State of Connecticut and desire to say that I have read the same with great pleasure and profit. It is particularly interesting and useful at this place where the subject of terminal facilities and port development is receiving close consideration with a view to making the Port of Los Angeles a harbor of the first class.

Very respectfully,
C. H. McKINSTRY,
Major, Corps of Engineers.

ISTHMIAN CANAL COMMISSION.

Washington Office.

January 10, 1912.

MR. EDWARD H. WARNER,
Chairman, Connecticut Rivers and Harbors Commission,
Hartford, Conn.

Sir:—This office is in receipt of a communication from Colonel George W. Goethals, U. S. A., Chairman and Chief Engineer of the Isthmian Canal Commission, requesting that there be obtained, for the official use of the Commission on the Isthmus, three copies of a report submitted by you in 1910, under House Joint Resolution No. 331, including its study of representative European ports by Frederick L. Ford.

This office has been unable to obtain copies of the report mentioned, or to ascertain whether the same has been published as a public document. If practicable, therefore, will you kindly furnish this office three copies of this report for transmission to Colonel Goethals on the Isthmus, or advise me where the same may be obtained?

Very respectfully,
F. C. BOGGS,
Major, Corps of Engineers, U. S. A., Chief of Office.

Many other requests for the report have been received from municipalities, harbor boards, universities, libraries and other interests throughout the United States as well as from other countries.

During the years 1911 and 1912 your Commission has been as active

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as their personal affairs would permit and have attempted in every way to bring about a better understanding of the necessity of improving our waterways and the advantages to be gained in treating the subject in a comprehensive manner to attain the greatest benefits for the shippers and other users of the rivers and harbors.

There have been held ten regular meetings, and nine special meetings concerning the New London Terminal, also numerous subcommittee meetings and informal meetings where less than the whole Commission was present.

The Commission was represented at the Convention of the Atlantic Deeper Waterways Association at Richmond, Va., in October, 1911, by Chairman Warner and Commissioners Cadwell, Chappell and Gildersleeve. Mayor Mahan and many others from New London were also present and through the effort of all, New London was selected as the place for the Convention of 1912. At Richmond, Troy, N. Y., was the strongest competitor, being represented by 45 members of the Chamber of Commerce and a band.

At this Convention at which 700 delegates from the seaboard states were present, Mayor Mahan spoke for New London and Chairman Warner responded for the State of Connecticut. Here the report of the Commission was sought and a special issue of the *Hartford Post* was distributed containing an article on the Connecticut River.

In December the Commission was represented at the National Rivers and Harbors Congress at Washington by Chairman Warner and Commissioners Cadwell, Gildersleeve and Chappell. This Congress is held at the time of the opening of the National Congress to impress upon the lawmakers the urgent necessity of a systematic development of the nation's waterways and to provide for a policy, not a project. There were over 1,000 delegates representing nearly every state in the Union, and speeches were made by Secretary of War Stimson; Dr. David Kinley, Ph. D., LL. D., Director University of Illinois; Hon. Joseph E. Ransdell, M. C., its president, who becomes United States Senator from Louisiana March 4, 1913; Hon. J. Hampton Moore, M. C., from Pennsylvania; Hon. Walter L. Fisher, Secretary of Interior; Brig.-Gen. W. H. Bixby, Senator Duncan U. Fletcher, Florida; Mr. August Belmont, New York; Hon. George W. Guthrie, Ex-Mayor of Pittsburgh; Mayor Gaynor, of New York; Governor Hadley, of Missouri, and many other distinguished gentlemen.

The Connecticut delegation met and selected the late Oliver Gildersleeve as State Vice-President for 1912, and E. H. Warner to reply to the roll on behalf of this state. These meetings are exceedingly interesting and give the delegates an excellent opportunity to learn what is going on concerning the waterways of the nation.

The Commission was represented at the XII International Congress of Navigation at Philadelphia in May, 1912, by Chairman Warner. There were 47 nations represented here and in order to show the representatives of the many nations every courtesy and to let them see as much as possible of the United States, the Federal Government appropriated $50,000, the

City of Philadelphia $50,000, and the State of Pennsylvania $25,000. Canada also provided the delegates with a trip through the Dominion at her expense to show what was being done with her waterways.

The Congress was welcomed by President Taft and by Mayor Blankenburg of Philadelphia, who addressed them in English, French and German, much to their delight. The meetings were divided into sections, one section dealing with Ocean Navigation, the other with Inland Navigation. The amount of knowledge to be gained at meetings of this character cannot be overestimated and is bound to be of a beneficial character to the state, bringing Connecticut into favorable position with the other states. Trips were provided without expense, to the coal fields, to Bethlehem Steel Works, to Trenton potteries, to Cramps and the New York shipbuilding plants, League Island navy yard, also to Washington, Harrisburg and Pittsburgh, the principal expenses being borne by the joint committees. A trip to Cape Cod Canal, one to New York thence up the Hudson to West Point and on to Albany, were also among the features. The latter trip was extended from Albany to Troy, Waterford, Schenectady, Fort Plain, Little Falls, Syracuse, Rochester, Lockport, and Buffalo to study the great New York State Barge Canal. Then to Sault Ste. Marie, Chicago and Gary.

The representatives of the foreign Government and commercial bodies as well as shipping companies were loud in their praise of the treatment they received in America. Your Chairman went over the Barge Canal and studied its immense proportions and realized its future benefit to all of southern New England through the new shipping routes of adequate dimensions that will be afforded.

The state again had its opportunity to contribute the Commission report to take its place among the publications of the various states, cities and those of Canada which were provided the delegates.

The Annual Convention of the Atlantic Deeper Waterways Association at New London in September, 1912, was another gathering of the advocates of the Intra-Coastal Waterways project at which the Commission was represented. This Convention was a revelation to the people of Connecticut who attended, giving them an opportunity of noting the enthusiasm with which the demand for the inland waterway on the Atlantic coast was being pushed forward, also of meeting men from every state from Maine to Florida. There were about 1,000 delegates and guests present, thus honoring Connecticut with the largest convention yet held by this organization. Here President Taft addressed the delegates and people of New London. The Navy Department ordered the battleship Illinois and two training ships into the harbor. The War Department fired the mortar batteries on Fishers Island at moving targets and the coast artillery gave a dress parade for the delegates. Trenton, Albany and Troy each came with large representative delegations, each with a band. Jacksonville, Fla., however, won the 1913 Convention through the energy of Mayor Jordan and his supporters. The National

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Rivers and Harbors Congress again met in Washington, D. C., December 4, 5 and 6, 1912. This Commission was not represented.

The state was represented by J. Arthur Allen, New London, Captain Thomas Hamilton, New London, and R. W. Miller of Bridgeport. These gentlemen were appointed by Governor Baldwin and like most of the advocates of waterway improvement, attended at their own expense.

The State Business Men's Association was represented by Frank H. Johnston of New Britain, F. S. Valentine of Derby, and A. W. Burritt of Bridgeport. Other associations including those from Hartford, Bridgeport, New Haven, Derby, Ansonia, Middletown, New Britain and Shelton sent representatives. The Hartford Business Men's Association has been represented regularly at these meetings since 1908. Mayor B. F. Mahan represented the City of New London, Mayor F. C. Murphy the City of Norwich and Mayor Joseph A. Halloran the City of New Britain. The entire Connecticut delegation numbered 27, which is an increase over previous years and reflects the increasing interest in waterway development.

The Commission was represented by the Chairman at the initial meeting of officials of United States ports at the Chamber of Commerce, New York, December 9-10, 1912. Representatives were present from Pacific, Gulf, Atlantic and Lake ports. A permanent organization was effected, known as the National Association of Port Authorities. This association intends to meet yearly, or oftener if possible, to discuss port organization, traffic regulations and charges, and terminal facilities. Also to exchange views upon all important subjects relating to shipping and to act as a sort of clearing house for exchange of information. Mr. Calvin Tomkins, Commissioner of Docks and Ferries in New York, was selected as President.

The Chairman and Commissioner Noone attended the hearing of the Commerce Committee of the United States Senate at Washington in February, 1912, concerning the right to dam the Connecticut river at Windsor Locks, Conn., which right was sought by the Connecticut River Co., the Northern Connecticut Power Company and the Enfield Power Company, which is referred to in detail upon page 31.

The Commission was represented before the United States Army Engineers at New London concerning the draw in the new East Haddam Bridge, Mr. F. V. Chappell appearing. The location of the draw and its length, 461 feet, thus giving two openings of 213 feet in the clear, which is ample for present and future navigation, was found satisfactory to the Commission.

The Commission was represented at a hearing held in Springfield, and one in Holyoke, in September, by the Chairman and Commissioner Cadwell. These hearings appertained to opening navigation of the Connecticut river between Hartford and Holyoke, Mass., and were conducted by the Connecticut Valley Waterways Board—a special commission raised by the General Court of Massachusetts, 1912 session, for the purpose of investigating conditions and reporting to the next General Court their findings and recommendations. This Commission is composed of Mr.

W. S. McNary, Chairman, who is also chairman of the Harbor and Land Commission of Massachusetts, Mr. Chas. P. Chase, President of the Springfield Board of Trade, and Mr. J. J. O'Donnell of Holyoke, publisher of the *Holyoke Telegram*. The first hearing was held at Holyoke in the rooms of the Board of Trade and was attended by fully 400 intensely interested manufacturers, business men and others of this thriving Massachusetts city. Among those who spoke in favor of navigation to Holyoke were, Governor E. N. Foss of Massachusetts, Mayor John J. White of Holyoke, W. H. Bullard, President of the Holyoke Board of Trade, H. B. Freeman, Jr. of Hartford, Commissioner W. H. Cadwell of New Britain and Chairman Warner. The Connecticut speakers agreed with the Massachusetts gentlemen that ways and means should be found whereby navigation could be opened at the earliest possible moment, thus giving Windsor, South Windsor, East Windsor, Windsor Locks, Warehouse Point, Suffield, Enfield and Thompsonville, Conn., Longmeadow, Springfield, West Springfield, Brightwood, Chicopee, Willamansett and Holyoke, Mass., with a combined population of 212,392 (census of 1910), the desired competition, and serve this 35-mile stretch of river again with steamboat and barge traffic with modern boats and up-to-date terminal facilities.

INSPECTION TRIP.

On October 8, 9 and 10, 1912, the Commission made an inspection trip covering the Connecticut river to its mouth from Hartford, the Thames river to Norwich, thence to Duck Island Harbor of Refuge, and New Haven Harbor, a short distance up the Quinnipiac, thence to Bridgeport Harbor, Black Rock Harbor, South Norwalk and Stamford Harbors.

On account of lack of time and bad weather the coast easterly from New London was not inspected and the Housatonic river and several of the smaller harbors were passed by. The trip proved very instructive, and through many prominent officials and business men who accompanied the Commission on various parts of the route, it was possible to gain a large amount of first-hand knowledge otherwise unobtainable. Among those interested and who favored the Commission with their presence were:

Senator Edward W. Hooker, Hartford.

Mr. Augustine Lonergan, Hartford, Congressman-elect.

Mr. E. S. Belden, Hartford, Breakwater Contractor.

Mr. A. E. Jones, Hartford, Harbor-Master.

Mr. T. J. Kelley, Hartford, Secretary Board of Trade.

Mr. E. M. Dexter, Hartford, President Business Men's Association.

Mr. J. M. Merrow, Hartford, Hartford County Manufacturer's Association.

Mr. L. F. K. Whitman, Hartford, Hartford County Manufacturer's Association.

Mr. S. F. Willard, Wethersfield, President Business Men's Association.

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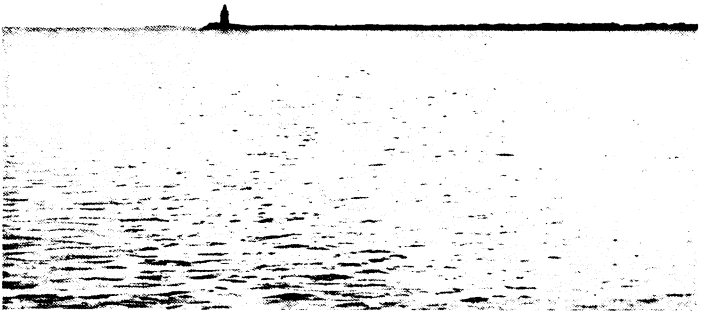
Shore Line Railroad Bridge, mouth of Connecticut River.
Length of Roller Lift Draw 150 feet.

State Highway Bridge, Saybrook, Conn.
Total length of Roller Lift Draw 213 feet.

Government Jetties at mouth of Connecticut River.



West Jetty Showing Lighthouse, mouth of Connecticut River.

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Mr. J. R. Andrews, New Britain, President Business Men's Association.

Hon. E. Hart Fenn, Wethersfield.

Major G. B. Pillsbury, New London, Corps of Engineers, U. S. A.

Mr. C. T. Shean, Springfield, Board of Trade.

Mr. Herman Burgi, Springfield, Springfield Gas Light Co.

Mr. W. S. McNary, Boston, Chairman Connecticut Valley Waterway Board.

Mr. C. P. Chase, Springfield, Connecticut Valley Waterway Board.

Mr. J. J. O'Donnell, Holyoke, Connecticut Valley Waterway Board.

Mr. W. F. Williams, Boston, Chief Engineer Harbor and Land Commission.

Mr. Eben Jackson, Middletown, Twentieth Century Club.

Mr. G. Ellsworth Meech, Middletown, Harbor-Master.

Hon. F. B. Weeks, Middletown, Ex-Governor.

Mr. A. R. Crittenden, Middletown, Manufacturer.

Mr. E. R. Rogers, New London, President Business Men's Association.

Mr. J. Arthur Allen, New London, President State Business Men's Association.

Mr. Thos. A. Scott, New London, Harbor-Master.

Hon. B. F. Mahan, New London, Mayor.

Hon. Frank J. Rice, New Haven, Mayor.

Mr. E. E. Durant, New Haven, Manufacturer.

Mr. G. E. Verrill, New Haven, Engineer of War Department.

Mr. Geo. B. Kellar, New Haven, Harbor Commission.

Mr. Edw. Gagel, New Haven, Harbor Commission.

Mr. E. Harris Weaver, New Haven, Harbor Commission.

Mr. Fred C. Bushnell, New Haven, Harbor Commission.

Mr. Edw. P. Avery, New Haven, Harbor-Master.

Mr. Walter B. Furst, New Haven, Benedict-Manson Marine Co.

Hon. J. Q. Tilson, New Haven, Congressman.

Mr. C. H. Nichols, New Haven, Chamber of Commerce.

Mr. G. E. Osborne, New Haven Yacht Club.

Mr. Geo. Redmond, New Haven, Townsend Bros.

Mr. Myron Durham, New Haven, Warehouseman.

Mr. Geo. Burgess, New Haven.

Mr. Geo. Scranton, New Haven, Manufacturer.

Mr. Wm. S. Pardee, New Haven, Commodore New Haven Yacht Club.

Mr. Garry Paddock, Bridgeport, Harbor-Master.

Capt. Ed. B. Palmer, South Norwalk, Harbor-Master.

RIVERS AND HARBORS.

Connecticut was treated by the hand of nature in a most bounteous manner so far as her rivers and harbors are concerned. A glance at the

map indicates the manner in which the state is subdivided by these rivers of importance and with a direct coast line of approximately 116 miles on Long Island and Fishers Island Sounds, indented by numerous harbors, among them being one of the finest on the Atlantic seaboard. Considering this, it is apparent that the state is well situated to enter into the coastwise trade to a greater degree than at present and to prepare to share in the great increase that is bound to come in the next decade in water transportation, which is to be stimulated by the completion of the Panama Canal. There is no reason why Connecticut should not again take rank as a maritime state. In fact, the completion of this great canal which has attracted the attention of the world and which will be successfully carried to completion long before the stipulated time under the able direction of Lieut.-Col. George W. Goethals, its Chief Engineer, has a significance that Connecticut should study in the most careful manner. Economic changes are bound to be wrought from coast to coast and the northern Atlantic will ultimately be a legatee of the changed conditions; hence if Connecticut is ready and willing a new field for profitable investment awaits her. Possibilities of future industrial growth of the state through this new avenue of commerce is not at all remote. Consider the opportunities presented by the tremendous forests of Oregon, Washington and British Columbia, which are to be brought thousands of miles nearer than at present; consider that the transportation of lumber from British Columbia to Atlantic coast ports of the United States now costs about $14.00 a thousand feet by way of Cape Horn, and that it will undoubtedly be brought via the canal for about $8.00 per thousand. This will have its effect on the southern lumber market and it is quite likely that the output of those mills will be diverted to the interior of the country and to a large extent up the Mississippi Valley. This means that lumber may come from the Pacific to this vicinity for distribution inland. It can be brought in foreign bottoms from British Columbia, the run of the mill; sorted and dressed at a planing mill in a great distributing yard, shipped into eastern Canada, receiving a drawback upon the duty, or may be sent to all parts of New England plus duty. Again we find huge waterpowers on the Pacific coast close to tidewater. Already great pulp mills are being erected, the logs coming to the mill in flumes, here made into pulp, using the cheap electric power generated by the waterfalls close at hand. It is the purpose of these concerns to cut up the clear stock from the huge spruce trees into lumber, using the great gnarled knots and the culls for pulp wood. They can load steamers at their own wharves with lumber, stowing baled pulp where the lumber will not stow well, thus sending their product cheaply to this coast. Large mills for the manufacture of newspaper are sure to spring up at some tidewater point where railroad facilities are good, to take advantage of this new economic condition. This is more apparent when it is remembered that the manufactured product takes a far higher freight rate, therefore the short haul to the market from the mills at tidewater is sure to be a factor to be reckoned with. There will be many other changes to come that are little realized and it

Upper New London Harbor during a Harvard-Yale Boat Race.

New London Waterfront opposite Railroad Station.

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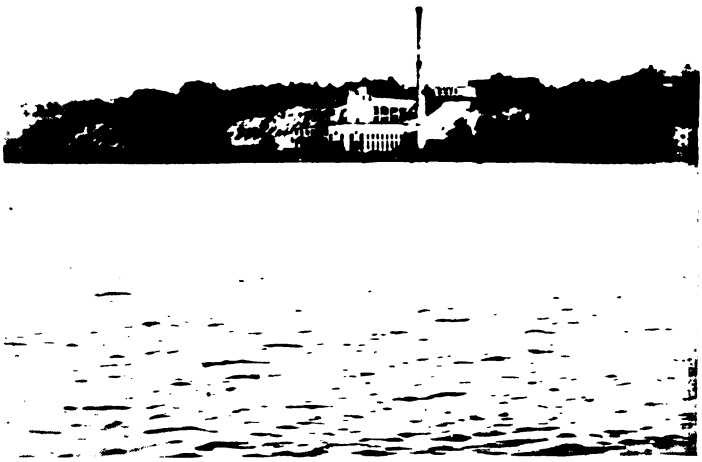

Power House, State Insane Asylum near Norwich on Thames River.

Norwich Harbor, Thames River.

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is with hope for Connecticut's future that we at least feebly try to have the people look to the development of its transportation facilities.

We append herewith a table showing the rivers and harbors of the state under improvement by the Federal Government, also giving the draft at mean low water and that available at high tide.

Table of the navigable depths of water in the various rivers and harbors in Connecticut, together with the mean rise and fall of tide.

Locality	Draft	Rise of Tide
Pawcatuck river	8 ft.	2.6 ft.
New London Harbor	23 ft.	2.6 ft.
Thames river	20 ft. to Allyn's Point	2.6 ft.
	14 ft. to Norwich	
Connecticut river below		3.4 ft. at mouth
Hartford	10 ft.	1.2 ft. at Hartford
Eight Mile river	8 ft.	
Harbor of Refuge, Duck Island	20 ft.	3.8 ft.
Branford Harbor,	6.5 ft.	6 ft.
New Haven Harbor	20 ft. main channel	6 ft.
	12 ft. Mill river	
	12 ft. Quinnipiac river	
	7 ft. West river	
Milford Harbor	9 ft. to Merwin's Wharf	6.2 ft.
	6 ft. to Town Dock	
Housatonic river	7 ft.	6.3 ft. at mouth
		4.2 ft. at Derby
Bridgeport Harbor	22 ft. lower main channel	6.5 ft.
	18 ft. upper main channel	
	18 ft. Pequonnock river	
	12 ft. Yellow Mill channel	
	9 ft. Johnson's river	
	12 ft. Cedar Creek	
	7 ft. Burr Creek	
Norwalk Harbor	10 ft. to So. Norwalk	7.1 ft.
	8 ft. to Norwalk	
	6 ft. to East Norwalk	
Five Mile river	8 ft.	7.2 ft.
Stamford Harbor	7 ft. west branch	7.4 ft.
	9 ft. east branch	
Southport Harbor	4.5 ft.	6.6 ft.
Greenwich Harbor	9 ft.	7.5 ft.
Westport Harbor and	6 ft. to Saugatuck	7 ft.
Saugatuck river	3.5 ft. to Westport	

PAWCATUCK RIVER. (Rhode Island and Connecticut.)

Is the state's most easterly river, forming a portion of the boundary between Connecticut and Rhode Island for 9 miles and is navigable to Westerly, R. I., a distance of 7½ miles from Stonington Harbor, the draft being 8 feet at mean low water. This river enters Little Narragansett Bay. Its commerce for the calendar year 1911 amounted to 53,921 tons, valued at $285,005.00. There is no Federal work of importance being done upon this river except that of yearly maintenance. Further improvements by removal of boulders and ledge rocks have been recommended by the Chief of Engineers of the War Department.

MYSTIC RIVER.

This river has received appropriations from the Federal Government of $40,100. Noank, West Mystic, Mystic and Old Mystic are located upon it. At Noank there is a thriving shipbuilding yard. There are also a number of other industries in the various towns. Coal, shipbuilding material and other articles are largely received by water. The last Rivers and Harbors bill appropriated $3,500 to redredge the channel. No report of the amount of commerce is available at this time.

THAMES RIVER.

This river is more a tidal estuary or arm of the sea. It is navigable to Norwich, Conn., fourteen miles from Long Island Sound, the draft being 14 feet, and 20 feet is obtained to Allyn's Point, about half way up. There is a railroad on both sides of the entire length, running close to the river. The nature of the bank is what may be termed fixed, hence there is little washing to be contended with. It is reported that the river has shoaled at a number of places, but otherwise is in good condition. A number of training walls should be raised several feet which would better navigation conditions. The river is well buoyed and lighted. The commerce for the last fiscal year amounted to 480,445 tons, valued at $7,063,796.39. There is a regular line of boats running from Norwich to New York, which is owned locally. This line stops at river points and New London and is understood to be quite successful. There is a regular summer service to Block Island from Norwich, operated by the New England Steamship Company. The Thames river has received excellent attention from the Federal Government. Norwich steamboat men and motor boat owners are anxious to have the old west channel opened again in order to avoid the long crossover from Allyn's Point to Stoddard's Wharf, they claiming that three-quarters of a mile would be saved each trip. It is stated that either end of this channel has shoaled and the rest has good water, hence the cost would be small as compared with the benefits that would accrue to shipping. The Harbor-Master at Norwich states that there were 576 trips of other than motor boats made on the river in July, 1912.

Wethersfield Cove, Connecticut River. State Prison at the extreme right. Picture taken during high water.

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View Showing Beauties of the Lower Connecticut River.
Here for miles the river runs very deep.

View near Gildersleeve Island, Connecticut River.
A large amount of good land is destroyed here yearly.

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In connection with this waterway we desire to call attention to the fact that the State Insane Hospital, at Brewster's Neck, a few miles below Norwich on the east side of the river, has a power-house located near the river with the railroad track between. This power-house furnishes the light, heat, etc., for the entire institution and consumes considerable coal in the course of a year, and inasmuch as the Insane Hospital at Middletown on the Connecticut river has its own coal-handling plant and receives coal under more adverse circumstances than would be the case at Norwich, yet at a large saving to the state, it would seem as if the question of water delivery at this institution would be a matter for consideration. There are a number of industrial plants that have sought the double advantage of water and rail delivery by locating on this river. The Thames River Specialties Company, which has located a large plant on the river at Montville, where they receive their coal and raw material by water, also have the advantage of rail shipment for their finished product. This company manufactures binders' and box board, and has recently doubled the capacity of the plant.

CONNECTICUT RIVER.

There is a great deal to be said about this river, mainly because is it the state's greatest stream and New England's longest river, receiving its name from the Indians as "Konnetikut," meaning long river. Today taking its place among the rivers of the nation, slowly but surely emerging from the forgotten to the lime-light of commercial activity, to receive a belated attention from the Federal authorities, the state, the municipalities, the manufacturers, the business man; that all may in future years have the benefits to accrue from a proper development of this great artery of commerce. This river, 350 miles long, flows through one of the fairest valleys known to mankind, teeming with inhabitants, endowed with industry and creative of invention, it has become a veritable workshop. Lined with magnificent cities, thriving towns and delightful villages, it invites the world to look upon it and compare its beauty, wealth, industries, agriculture and civic spirit collectively, and point out where there is a greater opportunity to bring to bear the present-day methods whereby requisite engineering skill shall devise a standard to strive for and then formulate the plan and carry it out.

Of its total length, but one-seventh is navigable. This does not compare favorably with any of the rivers of Europe, where for many years it has been the custom to develop the streams almost to their sources. The Rhine is a shining example of the combined effort of the states through which it flows. It has been made navigable for 535 miles to Basel, with a draft of 2 meters to Mannheim 354 miles, and is to be canalized from Basel to Lake Constance in Switzerland. A study of the methods pursued to attain the perfection in this magnificent highway of commerce and pleasure is a most interesting one, and to finally realize that there are employed in the commerce of this stream 13,000 boats, viz.:

Rhine Sea steamers, passenger boats, tug boats and barges, the latter being built mostly of steel and carrying from 1,500 to 3,000 tons on a draft, no greater than is now available in the Connecticut river, and to note that the tonnage of the Rhine is over 65,000,000 tons yearly, prompts us to applaud the intelligence of the German people in making this river so great. Another river that commands the attention of every student of waterway improvement is the Scotch Clyde. Not many years prior to the Fourth Act of Parliament in 1809, which gave the authority to deepen the river to 9 feet, there was available but 15 inches of water at Dunbarton bar. This improvement to 9-foot depth was the first great forward step, and in the 100 years succeeding the Clyde Trustees have deepened the river to 33 feet from the sea to Glasgow, at the head of navigation, a distance of 50 miles, which is the same distance as to Hartford, the present head of navigation on the Connecticut river. At the present time the Clyde Trustees have ordered a further deepening and widening of the channel so that the "Aquitania," one of the world's greatest ships, which is being built in a Glasgow shipyard, may reach the sea. Glasgow had a population as an inland city in 1809 of about 100,000, and after making the city a seaport it began to grow rapidly until it had a population of 872,021 in 1907.

Both the Rhine and Clyde are splendid examples of what can be accomplished by careful consideration, excellent judgment and unity of purpose, therefore should be used as an example for the future development of the Connecticut. It would be to the everlasting benefit to the people of this state and of the states of Massachusetts, New Hampshire and Vermont if provision was made for the study of these rivers by a joint commission, which should be, after making a report, constituted as we might say, a quadruple alliance, to carry out an ambitious and even pretentious development of the Connecticut river in conjunction with the Federal Government. The Commission should devise a plan of improvement upon broad and comprehensive lines to embrace navigation, protection of banks, disposal of sewage, development of water powers, reforestation of denuded lands and the building of storage reservoirs.

In connection with the improvement of the river along such lines, we quote below from the final report of the "National Waterways Commission."

FINAL REPORT NATIONAL WATERWAYS COMMISSION.

Conclusion 2. (In part.) "The time has already come, especially in the more thickly settled river valleys, when a stream must be considered with a view both to minimizing its harmful influences and to securing the maximum benefit from all its uses."

Conclusion 4. "The Federal Government has no constitutional authority to engage in works intended primarily for flood prevention or

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power development. Its activities are limited to the control and promotion of navigation and works incident thereto. The Commission is of the opinion that flood prevention is primarily a local problem, and the work of controlling floods should in the first instance be undertaken by the minor political subdivisions, but that the Federal Government may very properly participate with the localities in carrying out such works on navigable streams, where a substantial and necessary improvement to navigation will result. Unless some such policy as this is adopted and adhered to, there is grave danger that the Federal Government may go outside its proper jurisdiction and become involved in enormous expenditures which are for local benefit. It has sometimes been urged that the Federal Government should undertake works for flood prevention on non-navigable streams which happen to cross a state boundary line. It is clear that in such a case, if navigation is not concerned, the Federal Government should have nothing to do with flood prevention. A method is provided in the Constitution by which the states may cooperate for this purpose."

Already the Federal Government has begun the purchase of lands in the Connecticut Valley drainage area, authorized by the Appalachian-White Mountain Forest Reserve bill which passed Congress since our last report. The land acquired is in northern New Hampshire and cost $4.00 per acre. This with further purchase, will in time be of benefit to that part of the river traversing Connecticut.

The river within the state is divided into four distinct sections, the first commencing at the mouth and running to Deep River 11.3 miles by channel and 9.3 miles air line; most of this part of the river runs through low, marshy land, with here and there an outcrop of rock. There are few abrupt changes in the contour, thus the banks wash little and the channel holds very well. About 10% of the dredging is done in this section. The next section from Deep River to just below Middletown has a channel from 20 to 40 feet deep, and runs through high hills with rocky shores, making the most picturesque scenery upon the river. These hills rise to a height of about 600 feet within sight of the river. This section is 18 miles by channel and 15.5 miles by air line. There is no difficulty in holding the channel in this stretch. The third section from Middletown to Hartford, for the most part is very crooked, meandering through banks of alluvial soil and a subsoil of sand and clay, which is very susceptible to swash. The distance from the head of the narrows just below Middletown to Hartford by channel is 22.6 miles and by air line 14.7 miles, which gives an excellent idea of the river's eccentricities. Here the banks overflow during most freshets and are for the most part less than 20 feet, averaging perhaps 10 feet, which causes the broad meadows on either side to flood to a considerable depth, as freshets of 20 feet or more come almost yearly. The amount of dredging in this section is about 75% of the total for the river's navigable length of 51.9 miles. The fourth section runs from Hartford to the Massachusetts boundary, and except for two or three turns is very nearly straight. This section is not under

improvement and is about 22 miles long. From Hartford to Windsor Locks the banks are of the same general nature as between Hartford and Middletown, and from Windsor Locks to the state line the river runs principally through a red sandstone shale formation, therefore has banks that wash little.

In accordance with House Document No. 1294, 61st Congress, 3rd Session, adopted February 27, 1911, an improvement of the river has been under way the past season to increase the channel depth to Hartford to 12 feet at mean low water, and up to June 30, 1912, only 3% of the project had been completed. The first portion of this work put under contract was for the deepening of the channel across the bar at the mouth of the river to 15 feet at mean low water, and increasing the width from 200 to 300 feet. This contract has now been completed by the Taylor Dredging Company. A new channel has been dredged to full project width at Dividend bar just below Rocky Hill, but has been little used, it being stated that it was impossible to make the turns with tows. There seems to be a variance of opinion in regard to this. At this point in particular many stakes with small bits of white cloth were left in the river by the dredging contractors. These stakes are often covered by high water and by flood tide, which makes them a menace to small boat navigation. It should be necessary for those responsible for erecting them to remove them in all cases immediately the work is completed.

In August, 1912, bids were asked for a large amount of jetty and reveting work at Sears' Shoals, Glastonbury, Press Barn and Clay Banks bars. About 80,000 tons of stone were involved and there was but one bidder, who bid only on Sears' Shoals and Glastonbury, and at such a high price that the bid was rejected. It was not possible at the time to purchase stone suitable for the work or under favorable conditions upon the river, inasmuch as the only available supply had been apparently contracted for by an out-of-the-state firm of breakwater builders. After considerable activity of those interested in having the river improved, the alleged contract was annulled, and late in the season a contract for the Sears' Shoals improvement was awarded to E. S. Belden & Sons of Hartford. The balance of the work will, it is hoped, be carried out next season and this Commission will renew its efforts to have the work rushed with all possible speed. The Commission requested the removal of a sunken barge by the War Department. This barge was on the East Hartford shore about two-thirds of a mile below the highway bridge. At eight feet on the gauge above mean low water the barge was entirely submerged, and during all of April was a menace to small boat navigation. The War Department promptly advertised for bids and the barge was wholly removed.

The Commission held a hearing of small boat owners and others interested in navigation concerning the establishment of more aids to navigation from Hartford to the Sound. A request was made of the Lighthouse Service, Department of Commerce and Labor, for bettering the conditions. The Department sent an official to Hartford to confer

Badly Washed Banks of Connecticut River at Glastonbury. Swash of passing craft creates damage even at low water periods.

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Rock Banks, Connecticut River. No damage done here by erosion.

Another View of Rocky Banks of Connecticut River.

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with the Commission. After looking over conditions it was determined by the official that more aids should be established to facilitate the movement of the increasing traffic. The Department advises that they are studying the conditions and will report soon what will be done. During the year they have rebuilt the Chester Light with a concrete substructure and iron superstructure, surmounted with a light of increased intensity.

In the Federal Rivers and Harbors bill approved July 25, 1912, page 67, there was inserted a provision for a survey of Wethersfield Cove, Connecticut river, the object being to obtain if possible a better entrance channel.

This amendment was added to the bill by request of this Commission through the courtesy of Senator Brandegee. The purpose of the survey is to provide for deepening and widening the channel which enters this cove. The channel is about 500 feet long, crooked, and narrow. About 167 motor boats of various drafts up to 3½ feet now use the cove for anchorage. It is difficult at summer stage for the larger boats to enter on account of the outlet of the Franklin Avenue sewer, belonging to the City of Hartford, which passes under the inlet near its outer end. It is reported that a considerable number of larger boats would use the cove if the channel was deepened and widened.

The Corps of Engineers, U. S. Army, have examined the inlet and cove in accordance with orders from the War Department and have reported that in their opinion the project does not warrant an expenditure by the Federal Government because there is now no commerce entering said cove.

It is not customary for the War Department to improve waters that are supposed to be of no commercial value; however, this Commission believes that if boats of a greater draft could enter the cove there is a likelihood of creating commerce, as the Connecticut State Prison is located on the westerly bank and abutts the deepest water in the cove, which runs from 9 to 23 feet deep. Here is an opportunity for the state to receive its coal direct at the prison as is done at the Connecticut Hospital for the Insane at Middletown, where a coal-handling plant has been established at a cost of $45,000. The consumption of coal at this institution is about 9,000 tons yearly, and it is reported by one of the trustees that a saving of 50 cents a ton has been made since the installation of the plant. By improving the entrance to the cove and constructing a coal-handling plant, which could be done for far less than at Middletown, a probable saving would accrue to the state on the coal for the prison.

The Commission has asked for a review of the decision of the Corps of Engineers by the Board of Engineers at Washington. If the Federal Government will not improve the cove, this Commission believes that the state should undertake its improvement and that the sewer should be depressed. If this was done it is not unlikely that the Government would cooperate with the state.

EROSION.

As indicated, it may be assumed that the meadow-lands bordering the river are subjected to a maximum amount of damage. During freshets the swift current erodes the banks in many places, and even during the periods of mean low water the swash from steam and motor boats cuts away the banks. This is particularly true at Hockanum, Wethersfield, Glastonbury and Gildersleeve Island at Portland. In each case large areas of excellent meadow-land is being washed away annually. Never has the state paid serious attention to this condition or realized that all of the material washed from these unprotected banks goes into the channel below to thus impede navigation and make it more hazardous. Above Hartford the banks are also washing, and at a point directly above the Midland Division Bridge of the New York, New Haven and Hartford Railroad Company the river is eating into the east bank with great rapidity during freshets, and in the last few years has curved to the eastward to such an extent that it is probable that serious damage may be done and that the river may change its course. Owing to the long period of high water during the spring of 1912, the banks of the river became so thoroughly soaked that the damage done exceeded that of many years. Many river men state that they never remember a time when there was such a constant slumping of the banks through all the meadow section of the stream.

SURVEY.

At Wethersfield the Commission has caused a survey to be made of about 1,500 feet of river bank on the westerly side below the entrance to the cove. At this point there are five houses that are endangered by the encroachment of the river. They stand about 30 feet above mean low water, and during each successive flood the most northerly house is the point of attack. This house now overhangs the river at high water periods and is liable to collapse and fall in the stream during any future flood. There was at one time a road in front of this house, and the present occupant asserts that the house in which he was born stood east of this house and was washed away many years ago. If the northerly house, which belongs to the estate of Daniel Hurlburt, is destroyed, the next house will soon share the same fate. The Commission believes that the state should take immediate recognition of the erosion of all river banks and prepare to devise ways and means to save the destruction of property and to decrease the navigation hazard. We append a table showing the years in which floods have exceeded 20 feet in the Connecticut river since 1800. In addition to these floods, there is a flood or more yearly that goes above 10 feet. Every one of these floods damages the banks and by proper treatment, extending over a period of years, the erosion can be greatly minimized.

Precarious Position of House at Wethersfield, Conn., during a 21-foot Flood. Higher floods are not uncommon. Note rubbish dumped in front of second house.

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HARTFORD.

Dates When Water in the Connecticut River has Reached an Elevation Greater Than 20 Feet, from 1801 to 1912 Inclusive. Steamboat Records, U. S. Base.

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Jan. 1843	27.17	Oct. 1869	26.25	Mar. 1896	26.10
Apr. 1847	21.0	Feb. 1870	21.25	Apr. 1896	21.80
May 1850	20.75	Apr. 1870	25.33	June 1897	20.20
Apr. 1852	23.12	Apr. 1873	20.96	July 1897	20.40
Nov. 1853	20.50	Jan. 1874	23.87	Mar. 1898	20.60
May 1854	29.83	Apr. 1876	21.87	Apr. 1899	21.64
Aug. 1856	23.33	Mar. 1877	22.85	Feb. 1900	22.90
Mar. 1859	26.42	Dec. 1878	23.93	Apr. 1901	26.00
Apr. 1861	21.50	May 1879	21.42	Mar. 1902	25.50
Apr. 1862	28.67	Apr. 1883	20.50	Mar. 1903	23.40
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Feb. 1866	20.50	May 1886	21.80	Apr. 1909	24.05
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There are many opportunities for the establishment of industries in proximity to the river, notably at Saybrook and Middletown, and more particularly at Hartford. The latter city has in its environs vast acreages of land that is now almost useless, inasmuch as it floods at certain river stages. Reclamation of the lands would add tremendous values to the city's tax lists and would provide a place for future industrial and commercial expansion where rail and water transportation would meet, that would offer unrivaled accommodations and which would make Hartford a strong competitor with other rapidly growing industrial centers.

It is amazing to study conditions on western and southern rivers and compare them with the Connecticut. We have prepared the following table, which is worthy of close scrutiny. It is safe to say that wonder comes to everyone's mind as to what is the matter with "Connecticut."

COMPARATIVE FIGURES SHOWING EXPENDITURE, VALUE COMMERCE, ETC., OF FOLLOWING RIVERS.

	* Missouri	** Tombigbee	Brazos	Connecticut
Miles navigable	2,284.8	680.5	424	51.9
First Government Project Adopted	1834	1870	1880	1836
Total Expenditure by Government	$15,451,432.07	$7,614,076.86	$1,676,878.39	†$799,010.90
Av. Expenditure per year	$208,803.13	$181,287.54	$52,402.45	$10,513.30
Av. yearly Expenditure per mile	$91.38	$272.21	$206.31	$202.18
Commerce Short tons, 1911	371,011	460,859	3,063	683,326
Value of Commerce, 1911	$1,082,515.23	$6,670,890.31	$759,678.00	$23,537,837.81
Av. value Commerce per mile	$473.75	$9,663.07	$1,791.69	$452,650.72
Av. value per ton per mile	$0.0013	$0.0209	$0.0585	$0.711
Av. Government Expenditure per ton	$0.563	$0.039	$17.11	$0.0148

* The Government committed itself to the improvement of the Missouri with a 6-foot channel for 800 miles to Sioux City, Ia., at an estimated cost of $42,500,000, in the Rivers and Harbors bill approved July 25, 1912, and appropriated $800,000 to commence work.

** Includes Warrior and Black Warrior rivers, which are tributaries and are considered one river as far as commerce and improvement are concerned.

† Does not include amount above Hartford or projected work next season below.

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Portion of Docks at Hartford.

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ENFIELD DAM AND RAPIDS.

Known more familiarly as the proposed Windsor Locks power development, has become of late years a subject of a great controversy, through Congress, the state legislature and the courts.

In 1824 the General Assembly chartered the Connecticut River Company, conferring upon it the rights for the "purpose of improving the boat navigation of the Connecticut river," not only at Enfield Falls, but also in the State of Vermont, a subsequent act of the legislature of the latter state granting a like privilege. In 1829 the present locks and canal (about 5½ miles long) were completed and boats were allowed to pass upon payment of tolls, the charge authorized in the charter being 75 cents a ton of actual lading passing up through the locks and canal and 17 cents a ton on the tonnage of the boat. Down stream the charge was 50 and 17 cents, this largely because during good water boats would run the rapids, taking on river porters at Enfield, thus avoiding paying toll as the company undoubtedly made the rate in competition with river porters who polled the boats. The present dam at Enfield did not in those days extend clear across the river, hence boats could pass unobstructed.

In the forties the railroad appeared in the valley and the water navigation era had a setback, which in this particular stretch of the Connecticut river continues to exist to this day. As transportation by water continued to decrease, the Connecticut River Company continued to increase the length of its dam at the head of the rapids, until by an amendment to their charter in 1881, the dam finally stretched clear across the river. Mills were built on the lower end of the canal at Windsor Locks from time to time, and subsequently the function of the Connecticut River Company became that of a power company, caring for the now and then pleasure boat navigation. The size of the original locks, which are 80 feet long, 18 feet wide and 3 feet deep over the mud-sills, still in use, has never been changed, hence the insurmountable barrier to the proper navigation of the river between Hartford and Holyoke.

In 1880 the Federal Government ceased to improve this stretch of river, as the size of the locks precluded the use of the more modern boats, and the current in the canal, increased by power uses, was hard to negotiate with the shallow draft boats that could pass over the sills of the locks. However, for years there have been people in the valley who have insisted that the river should be so improved as to restore navigation to Springfield, Chicopee and Holyoke, Massachusetts. Many attempts have been made to get appropriations, but the opposition has been paramount. In 1878 a most comprehensive survey of this portion of the river was made by order of Congress under the supervision of Brevet Major-General G. K. Warren, Major of Engineers. His recommendations called for a canal leaving the Hockanum river at a point below the now Connecticut Boulevard, which is the main highway to eastern Connecticut from Hartford. This canal was to have locks at convenient points and was to

follow the higher table-land, which borders the meadows all the way to a dam at King's Island and from there to Holyoke by open river navigation. The cost of the project was largely responsible for its defeat. In 1905 another complete survey was made by the War Department under the direction of Lieut.-Colonel W. T. Rossell, Major George W. Goethals and Major J. G. Warren, Corps of Engineers. This project recommended the establishment of dams to make slack-water navigation possible, the first dam to be erected below the present stone highway bridge at Hartford. The maps with triangulations, accompanying this report, are extremely valuable and will continue to be so. This project, like its predecessors, died because of cost.

Thus has the key to the whole situation, the Windsor Locks Canal, continued to block the growth of the valley and deny to 212,392 people (census of 1910) above Hartford, up to and including Holyoke, the benefits of water transportation.

However, realizing the advantages to accrue from the development of an approximate maximum of 35,000 horse power and a minimum of 20,000 horse power, also that the Connecticut River Company only developed about 3,500 horse power of the grand total, and it being stated that this company would not sell its franchise granted by the State of Connecticut in 1824, it determined the Enfield Power Company to seek through Congress the Federal right to develop the unused power.

Their bill was introduced May 3, 1908. This bill provided for a dam at the foot of the Enfield Rapids (the present dam being at the head) which would take advantage of an additional fall of about 35 feet and create a pool extending up stream about 5½ miles; the proposed dam to have a lock in it, which would assure the greatly desired navigation to Massachusetts.

A little over a year later, another company known as the Northern Connecticut Power Company, holding a Connecticut charter, presented on June 25, 1909, a bill seeking the same rights as the Enfield Power Company and agreeing also to make navigation possible by providing a lock in their dam, which was also to be built at the foot of the rapids.

Spurred to activity by these bills, the Connecticut River Company introduced a bill to relocate their present dam, on July 9, 1909, but they did not agree to offer further facilities for navigation than those already afforded by their present locks and canal.

In the meantime a survey by the United States Army Engineers was authorized by Congress and ordered by the War Department, to determine if, in connection with the plans proposed, that navigation could be made possible from Hartford to Holyoke at a reasonable expenditure by the Federal Government. This survey was under the direction of Lieut.-Colonel Harry Taylor, Corps of Engineers, U. S. A. The same being concluded, a report was submitted to Congress, stating that if a dam or dams were built at Windsor Locks and a lock of adequate dimensions was built therein, that navigation could be extended to Holyoke, and recommended that the Government undertake the construction and main-

Windsor Locks Canal. Showing class of boat that can use the canal in its present condition.

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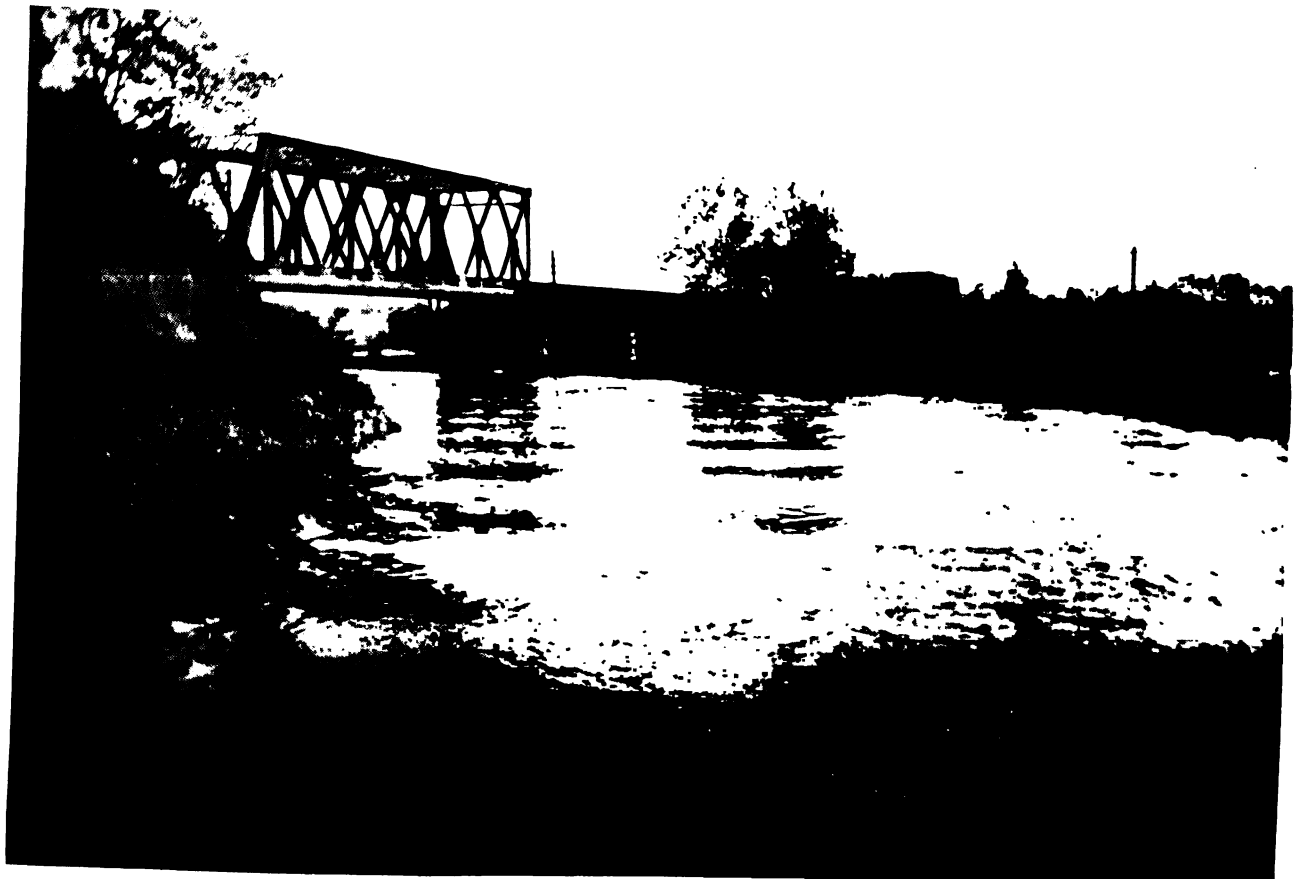

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tenance of a 7-foot channel from Hartford to Windsor Locks at an estimated cost of $1,015,600, provided:

"1. That a suitable lock and dam for surmounting Enfield Rapids be constructed by private or corporate interests, free of cost to the United States.

2. That navigation through said lock shall be free from any toll or charge.

3. That those constructing the lock and dam assume all responsibility for claims for damages that may arise from flowage rights, from injury to water power, or from any other source.

4. That after construction the lock shall become the property of the United States, and shall be maintained and operated at the expense of the Federal Government."

These provisions were agreed to by the Northern Connecticut Power Company, and the report of the Board of Engineers for 1912, submitted to Congress in December, again calls attention to the requirements of the Federal Government.

During the month of April, 1911, certain minority stockholders of the Connecticut River Company brought suit against that company for an accounting, thus further involving the situation.

Then came the 1911 session of the Connecticut legislature, at which both the Northern Connecticut Power Company and the Connecticut River Company sought legislation, the former seeking the right from the state to dam the river and the latter seeking to further amend their charter (they having received important amendments in the session of 1909), to allow the issuance of bonds up to $5,000,000, etc.

In the legislature it was pointed out by some that it should not be the policy of the state to allow so large a bond issue upon the company's capital, which was $203,500. The opposition grew very strong and many amendments were offered in connection with the desired amendments of the Connecticut River Company. Among them was one to annul the right of the company to charge tolls as provided in their charter of 1824. This amendment was defeated, thus meeting the same fate as most of those offered, other than by the Connecticut River Company. Finally an amendment was introduced in the Senate to apparently provide for no tolls. It was passed with the other amendments sought, returned to the House of Representatives and accepted by them. The amendments upon reaching the Governor were vetoed, the one concerning tolls, because of the fact that it stated through "said river" failing to provide for the "locks and canal." The veto was sustained, hence no legislation was enacted in behalf of either company, the Northern Connecticut Power Company's bill having already failed to pass.

On February 6-7, 1912, a hearing was held on the bills of all companies desiring this important right, before a subcommittee of the Commerce Committee of the United States Senate at Washington. This Commission was represented by Chairman Warner and Commissioner Noone, both making statements before the committee concerning the state's

EROSION.

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SURVEY.

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Danger to Houses, Wethersfield, Conn., on Connecticut River during a freshet

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HARTFORD.

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every courtesy in its power to such committee whenever it can come to Hartford.

Subsequently the Commerce Committee of the United States Senate submitted to the companies a list of twelve questions, which were later answered by them. Those of the Northern Connecticut Power Company were understood to be satisfactory.

About that time came the terrible disaster to the Titanic, the investigation of which was intrusted to some of the members of the Commerce Committee of the Senate, thus materially delaying any action on the power bills then before the committee.

On June 21, 1912, the stockholders of the Connecticut River Company met and voted to relinquish their right to charge tolls forever, which now makes such traffic as can pass up stream toll free, and assures the people of the state that there will be none as a bar on any further improvements which may be made by this company.

In September hearings were held by the Connecticut Valley Waterway Board of Massachusetts at Springfield and Holyoke, at which this Commission was represented by Chairman Warner and Commissioner Cadwell. This board was created by the last General Court of Massachusetts to investigate the Connecticut river and report back in February, 1913, what, in their opinion should be done to provide navigation for the cities of Springfield, Chicopee, and Holyoke, and what other improvements might be made that would be of benefit. The representatives of the Connecticut Commission assured the Massachusetts Commission that they would do all in their power to assure future navigation. After these hearings the joint Commissions with many prominent men from Holyoke, Chicopee and Springfield, made a trip in a 65-foot yacht, drawing about 3 feet, from Springfield to Hartford. It was intended to go below Hartford, but the trip consumed nearly the entire day, the delay being mainly in the river below Windsor Locks. Several times the craft ran aground and finally at the mouth of the Farmington river came to a sudden stop on a shifting bar, which taxed the strength of the entire crew and guests to get the boat off, but added, however, to the knowledge of all concerning the neglected Connecticut river above Hartford.

On October 11, 1912, it was announced by the various power companies that an agreement had been entered into by and between the Connecticut River Company and the Northern Connecticut Power Company, the Enfield Power Company having withdrawn, whereby both companies agreed to sell out to Stone & Webster of Boston, Massachusetts, who are large developers of power projects in the United States. This settlement of the controversy regarding the right to develop the Windsor Locks power is contingent upon a satisfactory grant being secured from Congress to dam the river at King's Island.

Inasmuch as assurances have been repeatedly given at Washington, indicating that if the contending power companies would reach an agreement, Congress would then quickly grant the Federal right to dam the river at this point, therefore it is hoped that the bill will be passed during the 3rd Session of the 62nd Congress.

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On November 22, 1912, this Commission and the Massachusetts Waterway Board held a joint meeting at the Hotel Kimball, Springfield, all of the Massachusetts Commission being present and all of this Commission except Mr. Chappell. The purpose of the conference was to agree upon the form that the part of the bill to be presented by the Connecticut River Company to Congress should be in, providing it was found to be unsatisfactory to navigation interests. Mr. H. B. Freeman, Jr., of Hartford, appeared for the power companies, and agreed to submit a bill within a week embodying the ideas of the joint Commissions. This was done, and the section four was agreed to be satisfactory and believed to be for the best interests of all concerned. (Section four has been changed to section three in S. Bill 8033.)

This section has been somewhat changed by the Board of Engineers, U. S. Army, but still provides the requisite protection to navigation. However, portions are not in accord with what this Commission believes for the best interest of the state. Further provision for controlling the flow is still delegated to the power company and not to the Secretary of War in accordance with the desire expressed before Commerce Committee, February last. Further objections will be entered. Since this report was prepared the Secretary of War has been vested with proper authority in S. Bill 8033, section two.

HOUSATONIC RIVER.

The state's second river in point of length, being 130 miles long and third in point of commerce.

This river is navigable to Derby and Shelton, a distance of twenty-two miles from Long Island Sound. It empties into the Sound at Stratford, a few miles east of Bridgeport, and offers an excellent opportunity for intercommunication between these places, as well as to New York. It has a draft at mean low water of 7 foot minimum and 11 foot maximum, and the value of its commerce for the calendar year of 1911 was $534,098.85, and 97,098 tons were transported. At Derby the Naugatuck river joins the Housatonic, and within a distance of 20 miles up this stream are the important manufacturing centers of Ansonia, Seymour, Beacon Falls, Naugatuck, Union City and Waterbury. In these places almost one-half of the rolled brass goods produced in the United States are manufactured.

There is an anchorage basin 12 to 18 feet deep, covering an area of about one mile long and one-eighth mile wide. The channel is well buoyed and lighted, and the river is protected by a jetty about one and one-eighth miles long.

By the use of the Housatonic river to its fullest degree, and with proper dockage facilities at Derby, freight could be brought from distant points by water and transhipped by rail to these places, thus giving the benefit of lower transportation rates, and when the Barge Canal is finished across New York State to the Great Lakes it will be quite possible to bring copper without breaking bulk from Michigan to Derby. It is

safe to say that if the Naugatuck river was in Germany it would be put to a better use than what a cursory survey of its present condition indicates.

STONINGTON HARBOR.

This harbor is located in the extreme eastern part of the state and is little used today except for traffic bound up the Pawcatuck river. It has received in the past considerable attention from the Government and once was the terminus of an important line of steamers known as the Stonington line, which ran to New York. The harbor is now used as sort of a ship hospital for non-commissioned steamboats. It is the last harbor of refuge before reaching the open sea and is protected from gales by two breakwaters, and has an anchorage basin for vessels drawing up to 24 feet and an inner basin 12 feet.

NEW LONDON HARBOR.

This harbor is the state's finest, as well as New England's. There has been but $159,000 appropriated for improvement or maintenance upon it by the Federal Government, of which the last $12,000 was for Shaw's Cove. It ranges in depth from 26 feet to 77 feet at mean low water, the tide being but 2.5 feet. The amount of commerce for the last year totaled 841,113 tons, valued at $78,323,083.10. The tonnage increase for the year was 5%. The passenger traffic of this harbor is very important, there having been 901,778 people entering and leaving during the year. The Federal Government is now considering improving the harbor in connection with the work the state contemplates carrying out, and it is expected that the next Rivers and Harbors bill will carry the authorization for deepening to 35 or 40 feet. The terminal work authorized by the state through the legislative session 1911 is reported elsewhere.

BRANFORD HARBOR.

The total appropriations for this harbor amount to $18,000, and its expenditure has been of great benefit to the manufacturing concerns in the vicinity. During the last year the commerce amounted to 41,744 tons, there being considerable iron, coke and sand for the factories. The value of this commerce amounted to $237,899.08.

NEW HAVEN HARBOR.

Has the distinction of being the state's principal harbor, doing a business of almost double its nearest competitor. There are three breakwaters protecting the outer harbor and at the same time acting as a harbor of refuge. These breakwaters have cost the Federal Government $1,267,-43.46 and are now completed to full project, length and height offering good protection for large boats from all directions except the southwest.

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Manufacturing Plant on Thames River. Coal and Raw Material received by water. Finished product shipped by rail or water.

New Haven Harbor. Showing Industries which border it.

Reveting Consisting of Concrete Slabs, for shore protection at the Movable Dam at Rotterdam.

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Report of Connecticut Riv

The total length of the three sections is 4,200 feet. It is reported that 6,112 vessels found shelter during the year. The city is situated at the head of the harbor, about four miles from the breakwaters. Here three rivers, the Quinnipiac, Mill and West enter the harbor. The former river has a navigable depth of 12 feet at mean low water, Mill river 12 feet, West river 7 feet, but is now to be improved to 12 feet. The harbor proper has a channel 20 feet deep and has ample anchorage basins. The city has recently established a new harbor line on the west shore, which will give an additional area for improvement. Both the east and west shores are susceptible to reclamation for large areas, and should such work be carried out it would furnish some of the finest manufacturing sites in the state, and undoubtedly would return to the City of New Haven many fold the expenditure required. So many concerns are seeking both water and rail locations in order to manufacture on a more economic basis that large industrial colonies would quite likely result in the not far future.

The commerce of New Haven Harbor amounted to 1,995,401 short tons the last calendar year, valued at $124,261,691.17. This is a fine showing and makes many western and southern projected waterway improvements appear at a disadvantage compared with the actual commerce in sight. The assistance of this Commission was sought by the New Haven Yacht Club concerning a breakwater at Morris Cove, and a hearing was subsequently held at the Hotel Taft, October 9, 1912, for those interested in and desiring a breakwater at Morris Cove, New Haven Harbor, to protect the pleasure craft, not only of local owners but of the transient, also for the protection of fishermen and of schooners, particularly from southwest gales. These blows usually come up suddenly and are severe. The Commission heard all who wished to speak upon the subject and was impressed with the fact that some protection is needed at this point. The following day an inspection was made of the proposed site for the breakwater, in company with Mayor Frank J. Rice and Messrs. George B. Kellar, Edward Gagel, E. Harris Weaver, Fred C. Bushnell and Edward P. Avery of the Harbor Commission, Mr. E. E. Durant, Congressman J. Q. Tilson, also Messrs. Walter B. Furst, C. H. Nichols, G. E. Osborne, George Redmond, Myron Durham, George Burgess, George Scranton and William S. Pardee.

The Commission has on file a petition from the New Haven Yacht Club and the Harbor Commission of New Haven, asking for the establishment of such a breakwater; however, under the present act it is not possible for the Commission to render other than a superficial service.

MILFORD HARBOR.

This harbor had a commerce the last calendar year of 34,350 short tons, valued at $634,870. The tonnage increase was 53.8% over the previous year. The harbor is used as a refuge for oyster boats, and a large number of pleasure craft seek it during the summer season. There is a 9-foot channel to Merwin's Wharf and a 6-foot channel up to the town

a Partly in Rhode Island.
b No commerce.
c Not reported.
d Benefits all shipping passing through Long Island Sound.
e Includes Mill, West and Quinnipiac rivers.
f No estimates available for calendar year 1911.

MUNICIPAL DOCKS.

Connecticut cities as a rule lack public terminal facilities, and as the improvement of all rivers and harbors is being made more and more contingent upon the same by the Federal Government, it is a matter that should have the serious attention of every community located upon navigable waters.

Norwich has a municipal dock, 20x40 feet, located up the Shetucket river. To reach this dock it is necessary to pass under the fixed Laurel Hill bridge. As the bridge is not high enough nor the basin big enough, it is impossible for a boat of any size to reach the dock. It has no storehouse, hoisting apparatus or rail connection.

New London has no public dock where commercial craft can land. The city owns a small frontage opposite the railroad station, which is used for pleasure boats, but is inadequate even for that use.

Middletown has a street end which is the city's sole ownership on the Connecticut river front, and it has not been developed for a public dock.

Hartford has established in conformity to the legislative act of 1909 a public dock. This act granted the city the right to build, own or lease public docks, etc., and gave the city the right of condemnation for a period of ten years. The city has leased a piece of land containing 4.3 acres at the foot of Charter Oak Avenue and at the confluence of the Park and Connecticut rivers. Upon the Connecticut river there is a two-level concrete and spile dock about 100 feet long. In conjunction is a brick warehouse containing about 7,500 square feet of floor space. There is no rail connection, however, the railroad bounds the west line of the dock property. This warehouse is built at an elevation above all floods. Since the establishment of this dock there has been an increase in business each year. During the open season of 1912 there have been arrivals from Jacksonville, Fla., Portsmouth, Va., Halifax, N. S., St. John, N. B., and from other nearby ports. The cargoes unloaded have consisted principally of lumber fireproofing and plaster. Conditions have been bettered by the establishment of the docks, and it is expected that a substantial increase of business will be noted from year to year.

New Haven has a municipal dock at the foot of Water Street which is about 375 feet long and has a considerable opportunity for expansion. There is no warehouse nor rail connection with the dock. Lumber fireproofing, brick, etc., are the principal cargoes received. New Haven is alive to the subject of creating better facilities, and in a recent report Mr. Frederick L. Ford, the City Engineer says, "The capacity of the

Hartford Harbor from Municipal Dock.

Municipal Dock and Warehouse, Hartford, Conn.

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municipal dock could be increased by about 200%. In question with such future extension, the question of providing extra storage space, storage or transfer sheds and hoisting cranes or mechanical equipment for quickly and economically handling cargoes should be thoroughly and exhaustively considered." Rail connection is also being thought of, and as Mr. Ford has the advantage of knowing how foreign cities equip their docks, having made a personal study and inspection of Europe's greatest ports, it will undoubtedly be New Haven's privilege to have an up-to-date dock at no distant date.

Bridgeport, the state's second city, has but 57 feet of publicly owned water-front, which is entirely too small to be of any avail. With the excellent harbor, fine anchorage basins, and with a rapidly growing manufacturing city within 55 miles of New York, it would be of great commercial benefit if the city had an ample, well-equipped municipal dock. There are several excellent locations available, and the city is vested with the right of condemnation if it is necessary to exercise it. Mr. Garry Paddock, the Harbor-Master, thinks that the city should have a dock at an early date, and hopes to have a piece of property owned by the city on Pequonnock river improved, which is 112x160 feet. It is already docked, but there is no channel to it at present. It is also hoped to have track facilities and hoisting apparatus on this dock, but it will probably be for city uses only.

Milford has a town dock which is in poor condition. There are no rail or warehouse facilities and no dock charges.

Stratford has a dock owned by John Bond, 80x100 feet, which is open to the public on nominal charges. There are no rail or warehouse facilities.

Greenwich has a public dock 250 feet front, no warehouse or rail connection.

Cos Cob has a public dock 250 feet front, no warehouse or rail facilities.

Mianus has a dock about 200 feet long, mostly leased to various parties.

Stonington and Stamford have no public docks.

ATLANTIC INTRA-COASTAL WATERWAY.

In 1907 the Atlantic Deeper Waterways Association was formed by merchants, manufacturers, shippers and business men for the purpose of working for a protected route from Boston to Jacksonville, Florida. The Association has held conventions in Baltimore, Norfolk, Providence, Richmond and New London. Through its efficient President, the Hon. J. Hampton Moore, M. C., Pennsylvania, and his enthusiastic followers, surveys of the entire route have been made by the War Department Engineers, and favorable reports have been made to Congress for the greater part of the route. The completion of this magnificent waterway means a great deal to Connecticut, connecting the state as it will with Boston to the

east and with Philadelphia and all the Chesapeake Bay cities, and even to the farthest south by a protected route, where shipping can find safe passage, where less costly boats can be employed in the movement of goods and insurance rates decreased, to say nothing of the great saving of time through the shortened route. All this will tend to expedite shipments, reduce hazards and decrease transportation charges, thus affecting every Connecticut port. The first link to be completed will be the Cape Cod Canal, which is being built by private capital, thus will not be toll free. This canal will be finished in 1913 and will be 25 feet deep with 100 foot bottom width, and it will also shorten the distance from Boston to New York appreciably. A warship passing through the canal would save 144 miles, while merchant vessels which traverse Long Island and Vineyard Sounds would save about 100 miles. The loss of life and property from 1843 to 1903 around this section of the New England coast is a good argument alone for the building of this canal. During those years 2,131 vessels were wrecked, 908 being total. Ten complete crews disappeared, and 700 fishermen and sailors have lost their lives.

Long Island Sound in most cases is a safe waterway. Upon reaching New York and passing down the coast to round the Delaware Capes for Philadelphia, a distance of 167 miles will be saved by construction of the New Jersey Ship Canal. The State of New Jersey has already appropriated $500,000 to purchase the right of way and is quite likely to increase this amount. The Board of Engineers, U. S. A., approve building this canal upon completion of the Panama Canal. The building of this link would be of immense advantage to all New England on the cost of coal. After the boats are in the Delaware another canal, which was opened July 4, 1829, and now has a 9-foot draft, being known as the Chesapeake and Delaware Canal, is to carry them into the former bay, which means that such cities as Baltimore, Washington, Newport News, Norfolk and Richmond will be brought miles nearer New England. The Board of Engineers also recommend the purchase and deepening of this canal by the Federal Government. It is a very important link because it will save a distance of 325 miles in going from Philadelphia to Baltimore. After Hampton Roads is reached the route is by Albemarle and Chesapeake Canal to Albemarle and Pamlico Sounds and out below Capes Hatteras and Lookout, into the usually calm southern waters. The Albemarle and Chesapeake Canal purchase and improvement was authorized in the last Rivers and Harbors bill and the work below has already been provided for. Thus a great work is well started and Connecticut should watch it, help it, and prepare to benefit by its completion.

ERIE CANAL OR NEW YORK STATE BARGE CANAL.

In our last report we paid particular attention to foreign terminal conditions. In this one we desire to call attention to what a neighboring state is doing in canal construction. The pictures herewith shown will

Lock No. 8, Champlain Canal, near Fort Edward, showing side walls in process of construction.

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Lock No. 5, near Waterford, nearly completed. The Machine in Chamber is part of a Belt Conveyor used for Carrying Mixed Concrete about 700 feet from Mixer to Lock. On left is Cofferdam, protecting the surface of the Rock

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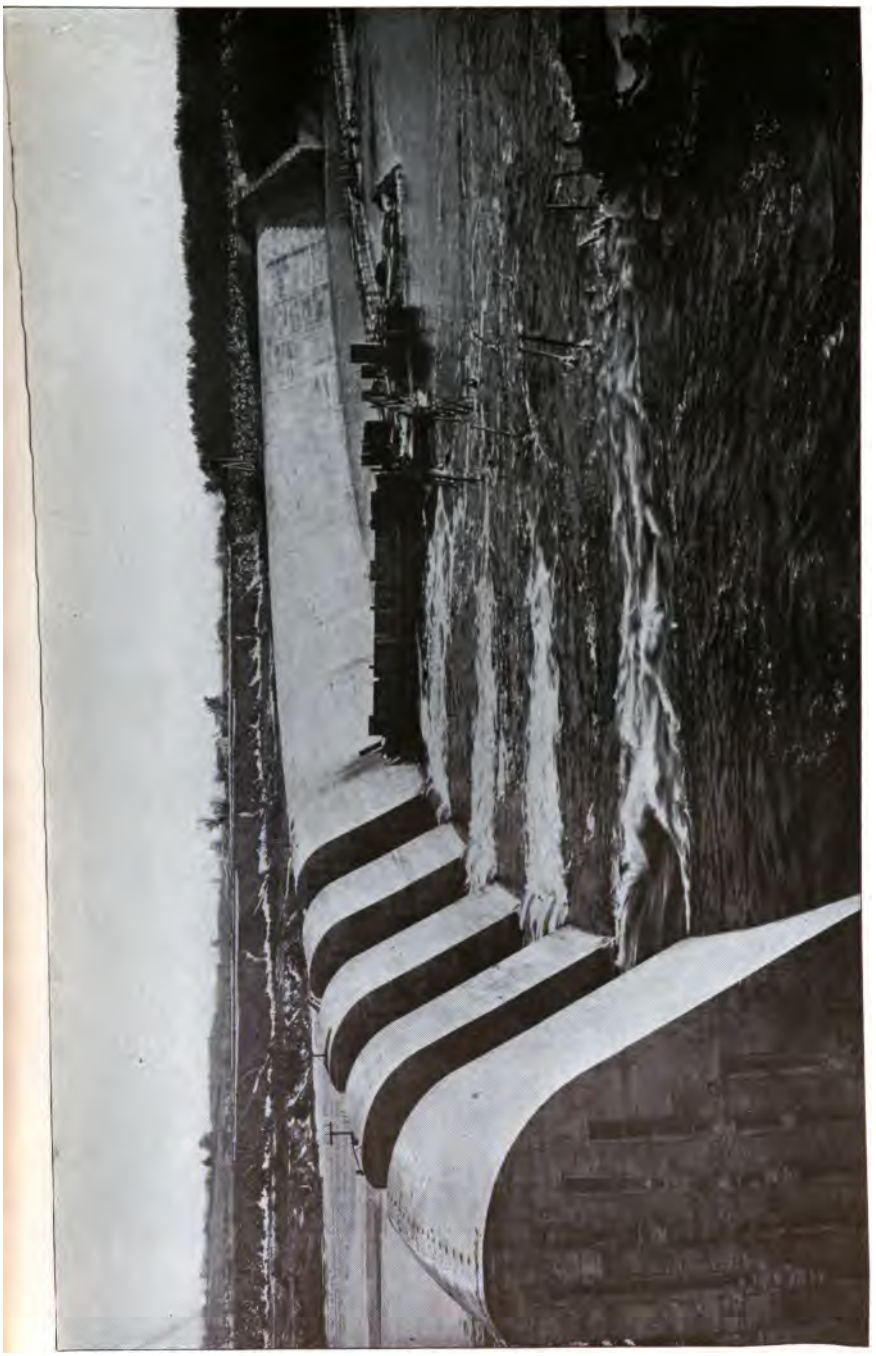
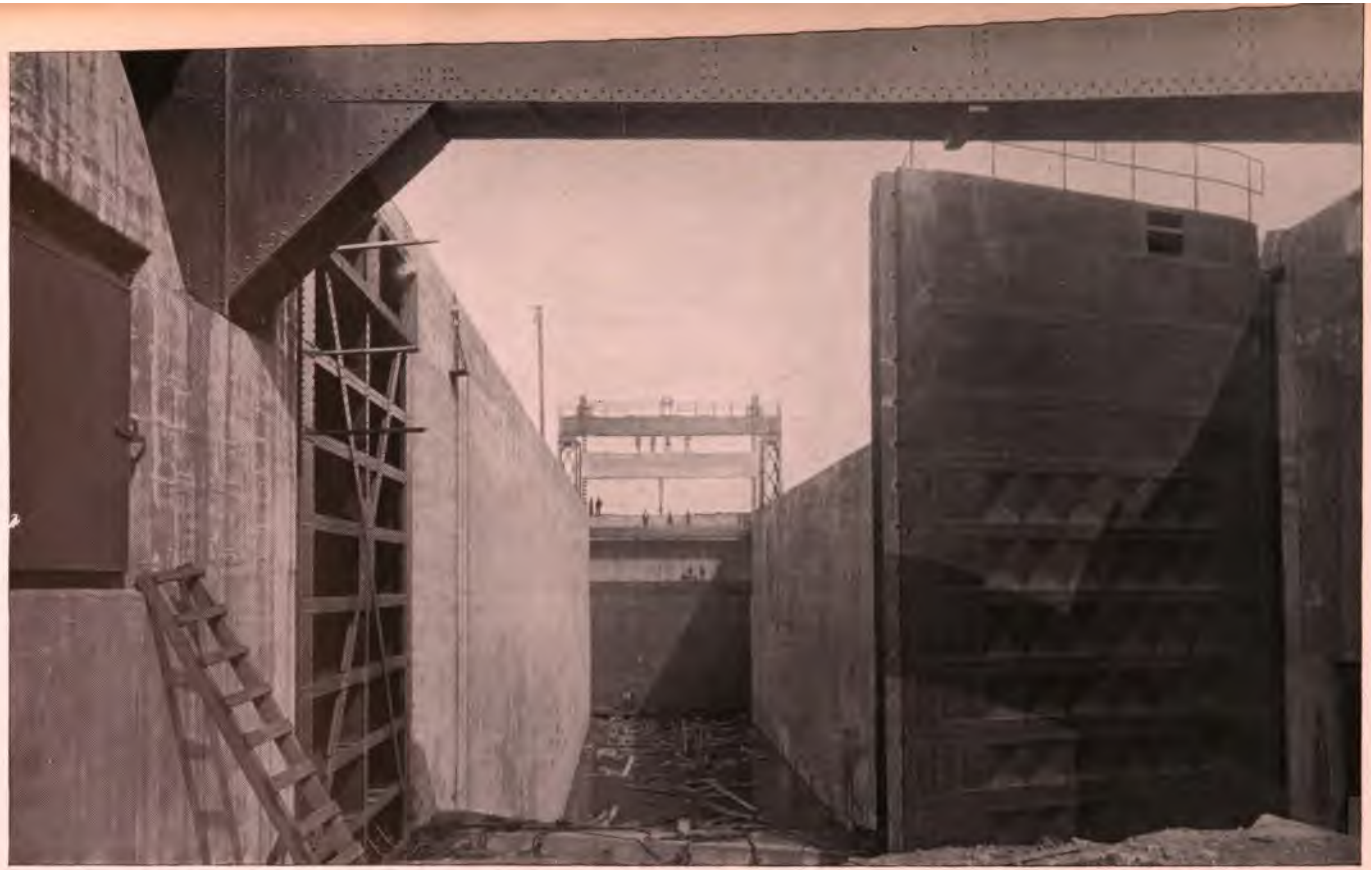
Report



Eastern Portion of Crescent Dam at foot of Mohawk River Navigation.

Nearby View of the Movable Dam at Cranesville.



Lock No. 17, at Little Falls, of 40 1-2 feet Lift. The lower gate of lift type, is seen in the closed position. The high side walls and the closed upper gate make the lock look narrower than the standard width, which is 45 feet.

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General View of Lock and Movable Dam, Bridge Type, at Tribes Hill.
Gates and Uprights raised, ready for floods or winter.

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portray vividly the gigantic work, and we say gigantic because it is one of the greatest of present-day engineering feats.

The original Erie Canal was commenced July 4, 1817, and completed November 4, 1825. Its construction, brought about by the energy and foresight of Governor DeWitt Clinton, was responsible in bringing New York into direct communication with the middle west and subsequently brought a great gain of trade and wealth for the entire state.

Finding that the old canal was inadequate to meet present-day requirements, it was decided by the people of the state exercising the right of referendum, to authorize the new canal in 1903, at a cost of $101,000,000. The canal, unlike the Erie, makes use of the Mohawk river to a point near Rome, New York, by the construction of dams, thus creating slack-water navigation. Elsewhere it diverges from the old route, particularly near Syracuse, where it utilizes the natural waterway, Oneida Lake, reaching Onondaga Lake, which will be used as the harbor of Syracuse by a branch canal.

Aside from this appropriation $7,000,000 has been authorized for the Cayuga and Seneca Canal and $16,000,000 for terminals, some of which will be located in Greater New York.

We are indebted to Mr. A. J. Bensel, State Engineer and Surveyor of New York, for use of the pictures herewith shown.

We append a table of facts concerning this great undertaking and desire to point out that upon its completion, about two years hence, another opportunity will be afforded to Connecticut to extend her water transportation business if the people are eager to do so.

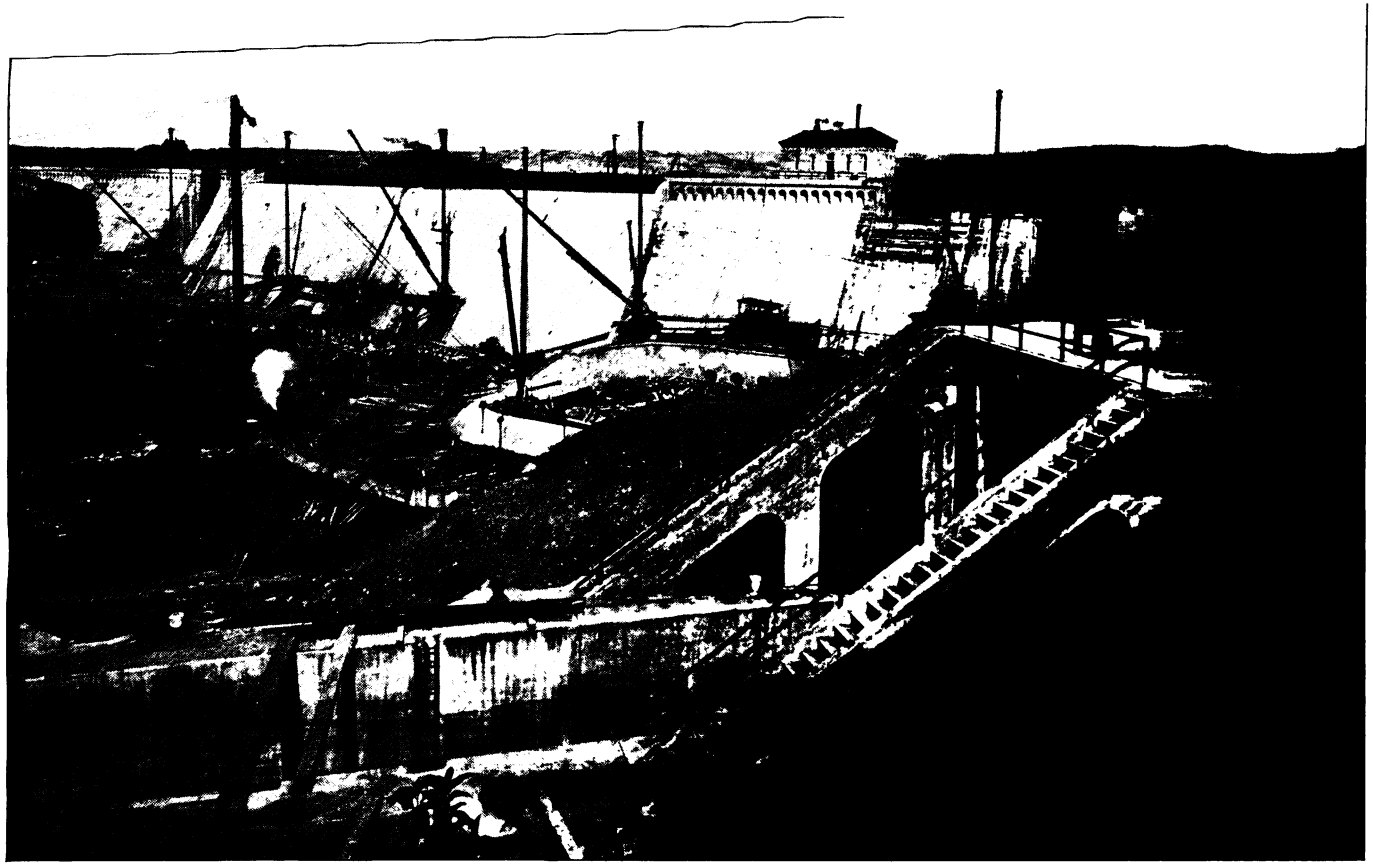
STATISTICS—BARGE CANAL.

Erie branch, length of canal, not including Hudson and Niagara river termini	323.2 miles
Erie branch, number of locks	35
Oneida branch, not included in above mileage, no improvement needed, about	19 miles
Spurs to Erie branch, (Syracuse and Rochester Harbors)	10.26 miles
Champlain branch, length of canal	61.5 miles
Champlain branch, number of locks	11
Oswego branch, number of locks	7
Oswego branch, length of canal	22.3 miles
Cayuga and Seneca branch, length (including spurs at head of lake), approximate	27.3 miles
Cayuga and Seneca branch, number of locks	4
Width of channel, land line, earth section, bottom, minimum	75 feet
Width of channel, land line, earth section, water surface	123 to 171 feet
Width of channel, land line, rock section, bottom, minimum	94 feet
Width of channel, river line, bottom, generally	200 feet
Depth of channel, land line and minimum river line	12 feet
Locks, length between gates	328 feet

Locks, available length ..... 310 feet
Locks, width of chamber ..... 45 feet
Locks, depth of water on sills ..... 12 feet
Dams, new 28
Dams, old with new crests 6
Dams, old used without change 5
Bridges 190
Boats, capacity, utilizing full lock width—about 3,000 tons restricted channel, and for two, travelling tandem, to be locked at one lockage—about 1,600 tons.
Authorization of work (Erie, Champlain and Oswego Canals), Chapter 147, Laws of 1903.
Authorization of work (Cayuga and Seneca Canal), Chapter 391, Laws of 1909.
Appropriation (Erie, Champlain and Oswego Canals) $101,000,000
Appropriation (Cayuga and Seneca Canal) $7,000,000
Construction work began (Champlain Canal) ..... April 24, 1905
Construction work began (Erie Canal) ..... June 7, 1905
Excavation preliminary (1903) estimate, not including work for dams, bridges, highways, railways and stream changes and other small items (Erie, Champlain and Oswego Canals) ..... 132,225,800 cu. yds.
Excavation contract plans (Erie, Champlain and Oswego Canals), approximate ..... 100,580,000 cu. yds.
Excavation contract plans (Cayuga and Seneca Canal), approximate ..... 9,100,000 cu. yds.
Concrete, preliminary (1903) estimate (Erie, Champlain and Oswego Canals) ..... 3,243,100 cu. yds.
Concrete, contract plans (Erie, Champlain and Oswego Canals), approximate ..... 2,800,000 cu. yds.
Concrete, contract plans (Cayuga and Seneca Canal), approximate ..... 150,000 cu. yds.
Length under contract, January 1, 1912 ..... 423.8 miles
Value of work done on contract to September 1, 1912 (contract prices, including alterations) $76,334,218
Value of work on contracts done to September 1, 1912 ..... $49,000,000
Delta Reservoir, capacity ..... 2,750,000,000 cu. ft.
Delta Reservoir, area of flow, crest height ..... 4 1-3 sq. miles
Delta Reservoir, drainage area ..... 137 sq. miles
Hinckley reservoir, capacity ..... 3,445,000,000 cu. ft.
Hinckley reservoir, area of flow, crest height ..... 4.46 sq. miles
Hinckley reservoir, drainage area ..... 372 sq. miles

PROPOSED NEW BRITAIN-MIDDLETOWN CANAL.

A glance at the map indicates a river running in a northwesterly direction from a point with its confluence with the Connecticut river, im-



A View from Below Nearly Completed Dam, Delta Reservoir, showing in foreground portion of flight of Locks on Relocated Black River Canal, while just beyond is Discharge Pool and Outlet Pipes.

Construction of Two Locks at Lockport, having combined Lift of 49 feet. In present Canal there is flight of five double locks. The new locks replace the south tier, the north tier caring for navigation during construction, and are

Completed Concrete Trough upon the Irondequoit Embankment. The sides and bottom are concrete.

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Formation Embankment at Irondequoit Creek, near Rochester.
Material being hauled in dump-cars and spread by water-jets.

Completed Channel, typical of the Rochester-Lockport Level, where in general the alignments of the Barge Canal and the present Erie Canal are identical.

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Section of Channel near Rochester, with Vertical Walls in Foreground and Rock Excavation, channeled below water line.

Double-boom Conveyor, Steam Shovel and Battery of Channelers Widening the Canal in Rock Cut West of Lockport, down to water level, during the navigation season.

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View of Ladder Dredge, showing Belt Conveyor Device for Carrying Excavated Material to spoil bank.

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mediately north of the City of Middletown. This river is indicated on the United States Geological Survey map as the Sebethe, but is known to the people of central Connecticut as the Mattabessett. It passes through or bounds the towns of Middletown, Cromwell, Berlin, Newington and City of New Britain, being formed by a number of small streams of good volume. For about six miles up from its mouth it winds through lowlands, marshy in many places; tidewater being noted this entire distance, which is to a point in East Berlin. From this point to New Britain the character of the country through which it flows is of a more rugged nature, the four miles more or less finding itself between narrow banks, rocky in some cases, with gravel and clay in others. The maximum rise in the contours in this distance is about 55 feet. It is obvious to anyone acquainted with canal construction that there is not a serious obstacle to overcome in the total distance of about ten miles.

The City of New Britain authorized a survey of the most feasible route for a canal through this valley by Hall & Bacon, and have furnished this Commission with blue-print maps of the same, consecutively numbered, noting all detail as well as property ownership, the city retaining the original drawings and profile.

Under date of November 20, 1912, the city forwarded to this Commission the following communication:

To the Rivers, Harbors & Bridges Commission, State of Connecticut:

November 20, 1912.

WHEREAS, The City of New Britain has authorized the survey of the Mattabessett river from Middletown up to New Britain, in contemplation of a barge canal to be built in this location and

WHEREAS, The City of New Britain has turned over to the Rivers, Harbors and Bridges Commission of the State of Connecticut duplicate drawings of said Mattabessett river and profiles preparatory to said Commission making a layout for said canal and an estimate of cost:

THEREFORE, the Common Council of the City of New Britain does hereby go on record as favoring the said proposed canal and asks your cooperation in obtaining the necessary action by the General Assembly of the State to secure the same.

NEW BRITAIN, CONN., November 22, 1912.

This is to certify that the above is a true copy of resolution passed by the Common Council of the City of New Britain, at its meeting held November 20, 1912.

ALFRED L. THOMPSON,
Deputy City Clerk.

The Chairman and Commissioner Cadwell have inspected the route on several occasions, once officially, and the Commission at a meeting authorized further examination of the proposed route so that a preliminary estimate of the cost can be made, including all excavation, building of embankments, locks, spillways, syphons, bridges, changes of highways and railroad.

REPORT OF

State Board of Civil Engineers

Whigville Dam, New Britain Water Supply, showing Core and Spillway Walls. Height of reservoir above city 391 feet.

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View Whigville Reservoir, New Britain Water Supply, capacity 80,000,000 gallons. Showing Dam and Spillway.

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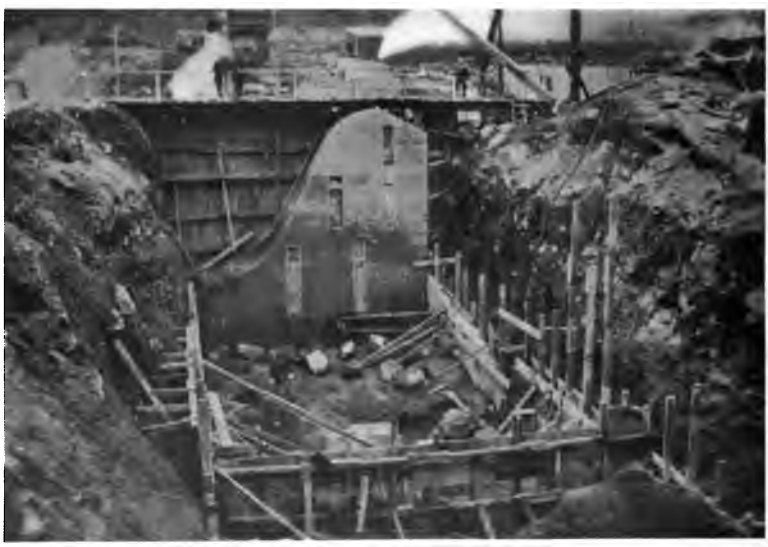
Remains of Dam Destroyed by Flood near Middletown.

Dam erected to take place of destroyed Dam near Middletown.

Spillway Whigville Dam, New Britain Water Supply.



Portion of New Dam being erected across Farmington River near Collinsville.

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APPOINTMENT OF STATE BOARD OF CIVIL ENGINEERS.

In accordance with Chapter 231, of the general statutes of the legislature of 1911, approved August 30, 1911, the following engineers were named to act as a State Board of Civil Engineers:

First Congressional District—Luther W. Burt, C. E., 39 Pearl Street, Hartford, Conn.

Second Congressional District—Edwin W. Bush, C. E., Lyme, Conn.

Third Congressional District—Albert B. Hill, C. E., 100 Crown Street, New Haven, Conn.

Fourth Congressional District—Horace G. Scofield, C. E., 940 Main Street, Bridgeport, Conn.

Fifth Congressional District—William G. Smith, C. E., 51 Leavenworth Street, Waterbury, Conn.

The above engineers, together with the engineer member of the Rivers, Harbors and Bridges Commission, William H. Cadwell, C. E., 213 Main Street, New Britain, Conn., constitute the Board of Civil Engineers.

The first five engineers were appointed on the third day of April, 1912, for a period of two years, or until their successors are appointed and qualified.

The object of said Board of Civil Engineers is to pass upon all questions relating to the construction and safety of all dams in their respective congressional districts in accordance with existing statutes.

Each of the members of the said State Board of Civil Engineers have made complete report of all inspections made by them since their appointment, which reports are on file in the office at the State Capitol.

Said reports in several instances include complete blue-prints of the work inspected, also photographs of the work during progress; they also show the importance of this branch of state inspection.

Your attention is respectfully directed to the views of dams in connection with this report, again forcibly demonstrating the need of exercising close supervision of all work of this character. We believe a number of changes should be made in the statutes to strengthen the same, as follows:

First. We believe additional legislation should be passed, increasing the duties and defining the authority of the said State Board of Civil Engineers, making it mandatory that all alterations, repairs, and additions, as well as new work, be reported to the engineer of each Congressional District by the owner, or owners, prior to the starting of any alterations, additions, repairs, or new work, and that plans and specifications be filed with the engineer prior to consent being given for the carrying out of any new work on dams that come under the general supervision of the said State Board of Civil Engineers.

Second. That complete biennial reports be made to this commission, with full details and plans of all work inspected, approved, or otherwise,

by each of said State Board of Civil Engineers, and that in important work—work of large magnitude, or risk—the opinion of the majority of said State Board of Civil Engineers shall be required in writing before consent shall be given to proceed with the work.

THIRD. That records of all future inspections, permits, plans on tracing paper, etc., be kept in the Commission's office.

WILLIAM H. CADWELL, C. E.,
Engineer member of the Rivers, Harbors and Bridges Commission.

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Damage done by Freshet. Dam near Meriden, Conn.

Defective Concrete Work on Wing Wall. Dam near Meriden, Conn.

NEW LONDON STEAMSHIP TERMINAL.

The bill authorizing the expenditure of state money for improvements for expediting the interchange of rail and water traffic in or near the City of New London.

SECTION 9. "Said commissioners shall not carry into effect the provisions of the preceding sections (viz., the construction of said improvements) until, after proper investigation, they shall have found that said improvements will, in their judgment, be for the commercial advantage of the state."

This provision placed upon the shoulders of the Commissioners the task of investigating ocean terminal conditions throughout the eastern seaboard.

Accordingly subcommittees were appointed, and the cities of Portland, Maine, Boston, Providence, New York, Baltimore and Philadelphia were visited.

In each city we found that the ocean terminal facilities were considered one of their most valuable assets.

We were given most hospitable receptions in every case, and every possible facility was accorded us in our investigations.

To go into the thousand and one details of our findings in each city is perhaps superfluous in a report of this kind where brevity is valuable.

In Portland we found it to be the well-established belief that the ocean terminals there are the very life of the city, which has doubled in population since their establishment ten years ago. The principal piers and elevators are owned by the Grand Trunk Railway Company. Plans are on foot there for extensions in facilities under state or municipal ownership of new construction. There is no doubt of a tremendous increase in the value and importance of the port. We visited their grain elevators and docks, and were astonished at the amount and variety of freight awaiting transfer. Among the articles which we particularly noticed on account of their quantity were canned goods, hams and meats from Chicago for export, and a large assortment of miscellaneous goods from western United States and Canada. It is probable that with equal harbor facilities New London may reasonably expect a large amount of a similar class of business. We were taken down the harbor of Portland in a steamer, and noted the number of large schooners, steamers and commercial vessels at anchor. There were two steamers in port unloading and six were bound for port. The harbor was frozen over as far as the eye could see, and it was necessary for the steamer to break it up, proceeding under reduced headway.

At Boston we visited the piers, docks and railroad connections, and were taken on a trip down Boston Harbor, which gave us an excellent idea of the important part water facilities are playing in the development of that city. The millions of money being spent there by the state and by the city speak eloquently of the value of their maritime position. The development of that entire section of Massachusetts seems to depend on the increased prosperity of Boston, which prosperity in turn, is hand in

Looking from Groton toward New London.

Central Vermont Pier at extreme right, New England Steamship Co. Pier, extreme left.

Lower New London Harbor during visit of New York Yacht Club.

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and with water terminal improvements. Without these facilities Boston ealizes that she will stagnate or slip back; with them she realizes that he can claim her place among the great cities of America.

At Philadelphia and Baltimore conditions are the same. Millions have been spent, and their expenditure has resulted in great and immediate benefit to their entire localities. At Philadelphia particularly, the splendid new piers and the excellent arrangements for transfer of freight are impressive. Although Philadelphia is located a long way from the sea, dredges have to be at work constantly during the months of open water, and powerful ice-breakers are owned and operated by the city during the winter months. Despite these disadvantages Philadelphia is a great port, growing and prosperous, and a leading factor, perhaps *the* leading factor in the development of Pennsylvania.

It is worthy of note that New London is free from the disadvantage of Philadelphia. Here we are near the sea; on account of the character of the bottom and the clear water flowing down the Thames river, dredging once done is done practically for all time; and we are never icebound.

New York is of course the leading port of America. To her sail ships of every flag, and from her gateway goes forth merchandise to every part of the world. New York is the only port in the United States that needs fear no competition. Having no fears of her prosperity, her views in regard to the development of nearby ports are most broad, and it was in New York that we found the best evidence that it would be to the advantage of Connecticut to develop New London. Every great port should have, back of its docks, a belt line of communication, leading not only from each dock to railroad connections, but also from dock to dock so that merchandise may be transported cheaply from one vessel to another. New York, being located on an island entirely covered by extremely valuable city property, has not the room and cannot afford to take the space necessary for a belt line. But as some sort of a belt line is absolutely essential, New York has found a substitute therefore in an enormously expensive system of lighterage. Millions of tons of material are transported not only from dock to dock, but from docks to railroad tracks by lighters. This costs so much money that it makes terminal charges at New York very high, and consequently tends to crowd out the classes of freight which demand low rates and cheap facilities.

Passenger service, broken cargo business, perishable goods and goods of great intrinsic value can stand these rates and do, in order to enjoy the advantage of the greatest port in America, but cargo-lots, bulk goods, raw products, etc., cannot, and these are the classes of freight that are trying to enter New York in vain, that are perplexing the shipping authorities there.

We found that thousands of tons of sugar were discharging from vessels in New York docks to lighters, was taken in the lighters to smaller steamers, carried up Long Island Sound to New London and there placed on cars for delivery to Canada. This is also true of South American hides. This expensive way of handling such bulk goods adds between

ninety-five cents and one dollar per ton to the freight, every cent of which would be saved if the cargoes of sugar and hides could come direct into the port of New London. So interested were the people concerned in these shipments that they investigated New London's present facilities, after our visit, with a view to bringing sugar in at once, but there was not water enough at the docks to admit the ocean-going vessels. In this age of close competition, ten cents saving would bring the business to New London, and here we show a saving of nearly if not quite one dollar per ton.

These are but examples; others might be quoted. Grain alone offers a tremendous opportunity — not only Canadian grain from the great fields of northwestern Canada, but American grain, bound beyond the Atlantic via the new barge canal from the Lakes. The new class of large barges which will bring grain and other merchandise from the American West via the Great Lakes, can come up Long Island Sound to New London with absolute safety, and at an additional cost of only about five cents per ton in freight rates. This five cents is only a small fraction of what it would cost to stop this merchandise at New York and submit it to the terminal charges there. So we were pleased to find that grain shippers of Buffalo were interested in the establishment of a port at New London and believed that business of this character would use the port in connection with Canadian grain shipments.

In New York our subcommittee was given an interview with one of the greatest financiers of the world, who is vitally interested in ocean business. He told us that the ocean terminals of the world today are unable to take care of the tonnage offered; that the great ports were all congested; that the trend of shipping therefore is towards the smaller ports; that with the opening of the Panama Canal the demand for terminals will perhaps double; that ships are being built for this increased demand, but that practically no adequate dockage is being prepared. He said to us that if we built docks they would be used from the start, and that in the building of ocean terminals we would find it an axiom that trade would follow the facilities.

The Chairman of the Committee on Piers for the Harbor of New York for the Maritime Exchange wrote us that we could make no mistake in the improvements of New London, "Because," he said, "New York cannot extend her facilities much further and cannot now keep pace with the increased demand."

Mr. Calvin Tomkins, New York's wise and far-sighted Dock Commissioner, told us that in his opinion New York would send enough business to establish us as a port. Mr. Tomkins has written an article on the development of New London that is as optimistic as if he were personally interested in our welfare.

Professor Edwin J. Clapp of New York University, Traffic Expert and now Special Traffic Commissioner of the Directors of the Port of Boston, who has made many investigations, appeared before the Commission in relation to terminal improvements and approved of the contemplated development of New London Harbor.

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In short, the evidence in favor was so great that on July 9, 1912, your Commission, at a meeting with all present, passed the following resolution without a dissenting vote.

"Resolved by this Commission: That having, in pursuance of the powers and duties upon it conferred by virtue of the provisions of Senate Joint Resolution No. 216, made proper investigation of the subject thereof, this Commission finds that it will, in its judgment, be for the commercial advantage of the state to provide for such development of the port of New London, in the towns of New London, Waterford and Groton, as is authorized by the terms of said resolution, and to make reasonable expenditures for the purposes mentioned in said resolution."

Since then a consulting engineer, Mr. William T. Donnelly of New York, has been engaged. A resident engineer, Mr. Waldo E. Clarke, has been engaged, with a working force. Maps of New London's water-front and abstracts of real estate titles have been prepared, borings of the harbor have been taken, and we are able to report real progress so that in the early spring we may begin construction work.

In conclusion of this subject, we may say that as Maine has Portland, Massachusetts has Boston, Rhode Island has Providence, the State of New York has the City of New York and as Pennsylvania has Philadelphia, so may Connecticut soon say that she has New London as an ocean port and thus step into her proper rank among the North Atlantic seaboard states of the Union.

RECOMMENDATIONS.

The Commission recommends changes in the following laws:

Amendment to Section 4752 of the General Statutes concerning harbor-masters.

Amendment to Section 4756 of the General Statutes concerning the removal of vessels.

Amendment to Section 4788 of the General Statutes concerning the obstruction of navigation.

Amendment to Section 4754 of the General Statutes concerning the powers of harbor-masters.

Amendment to Section 4787 of the General Statutes concerning deposit of material in water courses.

Amendment to Section 4786 of the General Statutes concerning obstruction of water courses.

Amendment to Section 4769 of the General Statutes concerning disposal of refuse in navigable waters.

Amendment to Section 4767 of the General Statutes concerning speed of vessels and jurisdiction.

Amendment to Section 4801 of the General Statutes concerning salary of Board of Civil Engineers.

Amendment to Section 4803 of the General Statutes concerning increased powers of Board of Engineers.

Amendment to Section 4805 of the General Statutes concerning apportionment of compensation of Board of Engineers.

NEW LEGISLATION.

An Act concerning appropriating money for reveting and improvement of the Connecticut river.

An Act concerning the disposal of old vessels and other floating obstructions.

An Act concerning the alteration and repair of dams.

An Act concerning removal of materials from the waters of the state.

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